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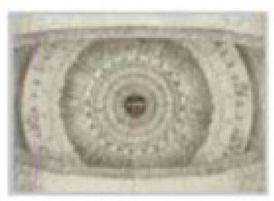

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Yasin Hasanian

Personal portfolio site
www.superhero.cgsociety.org

Country Iran

Software Maya, ZBrush, MARI, Arnold, Photoshop, NUKE

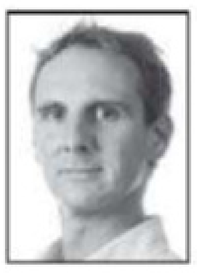
Once you've finished marvelling at this month's spectacular cover image, head on over to page 40 for a step-by-step guide to re-creating it yourself at home or in the studio. From crafting the beak to generating unbelievable feather textures, no stone is left unturned...

“I am fascinated by the eagle: a symbol of power and freedom”

Yasin Hasanian shows you how to re-create nature with XGen **Page 40**

Welcome

to the magazine and 100 pages of amazing 3D



Welcome to 3D Artist magazine! The natural world is full of inspiration for artists of all disciplines. In this packed issue, nature expert Yasin Hasanian guides you through the process of making our incredible cover image on p40. Elsewhere in the magazine, learn to accurately re-create the elements in Maya (p22), produce stunning fantasy arch-vis in Blender (p60) and reach new heights in 3ds Max with our 50 professional tips and tricks (p30). Enjoy the magazine!

Dan Hutchinson Editor in Chief

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5. **Tips for studying 3D or getting work in the industry**
6. The chance to see your art in the mag!

This issue's team of expert artists...

Yasin Hasanian

A master of his craft, photorealism expert Yasin Hasanian helps you re-create another one of his wonderful projects on p40 – namely our incredible cover image!

Orestis Bastounis

Our intrepid technology expert gets his hands on the new MSI Ghost and the new card from Nvidia; the Quadro K5200. Check out his verdicts from p82.

Ben Simonds

Arch-vis master Ben looks to fantasy for his inspiration as he takes you through a step-by-step guide to creating a castle in Blender. Head over to p60 for his expert tips.

Stefan Haberkorn

Learn all about how to model, render and texture an old German classroom on p68, effectively utilising Cinema 4D and V-Ray with Stefan's professional advice.

Daniel Bel

Daniel has created a wonderful image using 3ds Max, ZBrush and others – learn all about how to sculpt dynamic forms, including his creative project, on p50.

Paul Champion

Highlighting a key technique, Paul talks you through how to remove a moving object in NUKE, even if it changes in scale or perspective. His tutorial is on p78.

Chris Gillett

Chris looks to Marvelous Designer to adapt a sculpting workflow on p76, importing Marvelous Designer files into ZBrush to utilise the former's cloth-simulation prowess.

Yasser Farahi

Have you ever wanted to animate something that looks as if it has been hand-drawn? Yasser's handy guide on p74 takes you through the process in Cinema 4D.

Tim Clapham

Cinema 4D aficionado Tim goes hands-on with the latest version of the pro software, providing a definitive verdict in his expert review on p84.

Sign up, share your art and chat to other artists at www.3dartistonline.com

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Image - Lorenzo Zitta

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LightWave 11.6

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INSIDE ISSUE SEVENTY-FOUR

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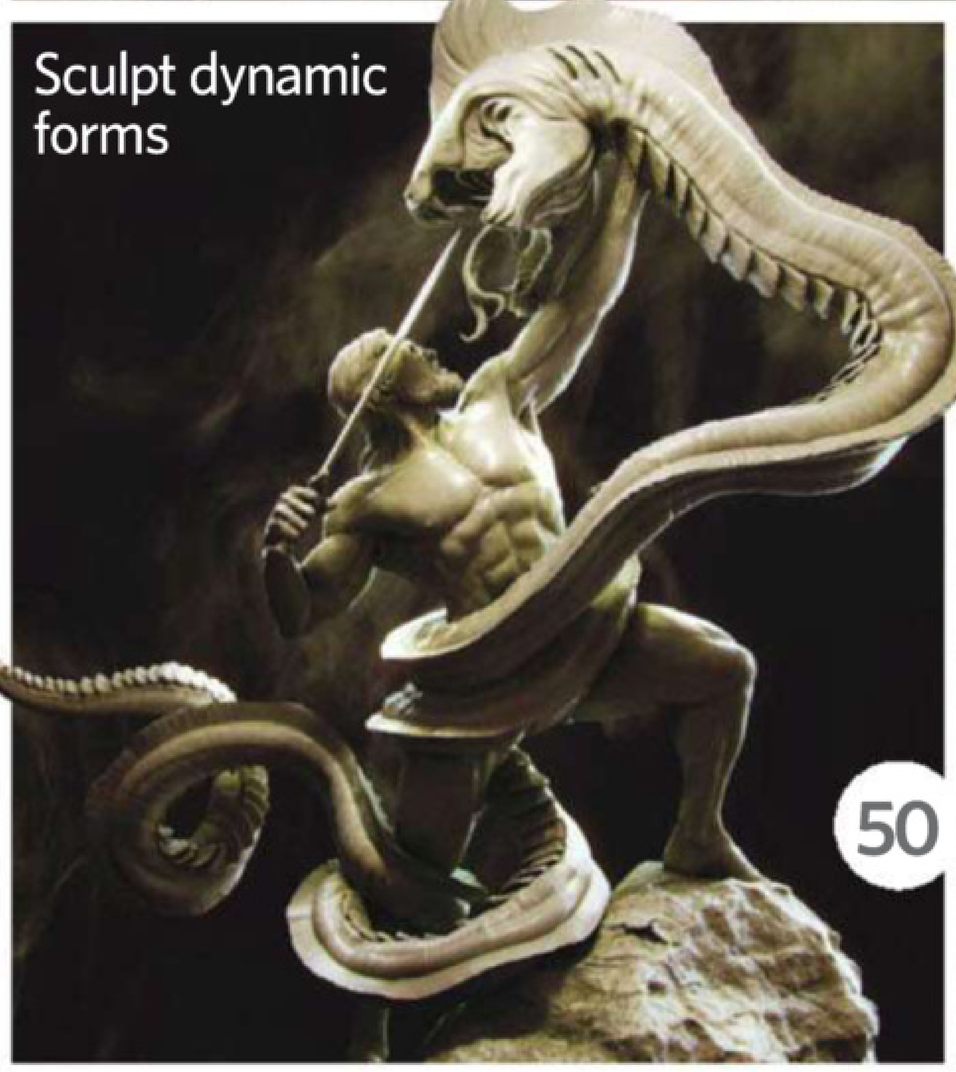
50 3ds Max tips and tricks

"It doesn't matter if the units are in inches or centimetres as long as your scale is real world"

Hasan Bajramović shares his advice for realistic models **Page 30**



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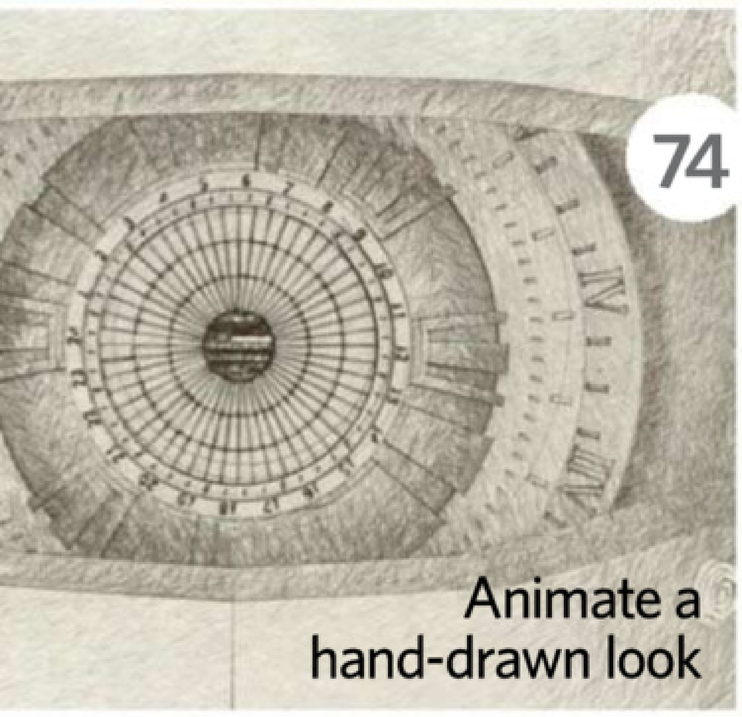

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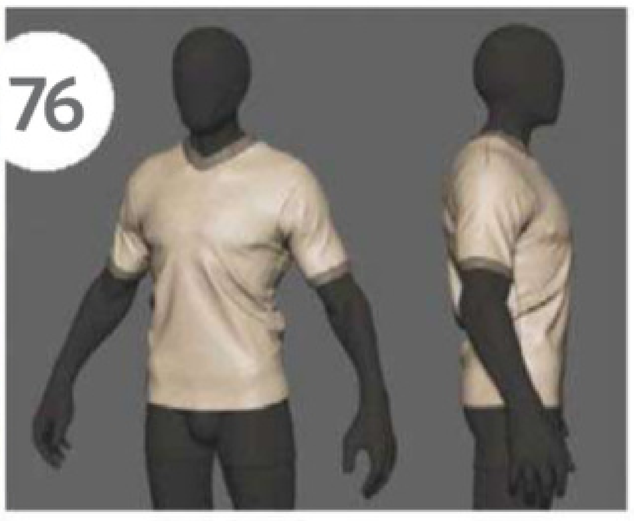

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The Gallery

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Mark Chang

3DArtistonline

Username: Equinoz

Personal portfolio www.artstation.com/artist/Equinoz

Country Taiwan

Software Cinema 4D, ZBrush, KeyShot, Photoshop

Work in progress...

> KeyShot is a great piece of software when you want to render a realistic image in minutes. Simply import the model and an HDRI, put some nice textures on it, and then in post-production add the final details

Mark Chang, *Space Force*, 2014

Bertrand BBB3viz

A French 3D architecture and product-visualisation artist now focusing mainly on R&D

Personal portfolio
www.bertrand-benoit.com

Country France and Germany

Software 3ds Max, Corona renderer, Photoshop

> Since we're dealing with vintage glass, a few elements came together to create a realistic-looking glass shader. These included imperfections in the model itself, which were achieved using noise deformers and textures

Bertrand BBB3viz, *Corona glass*, 2014

> Loft 69 is my first interior design. I wanted to create a very compact space, yet one that would also feel comfortable and relaxing
>
> **Peter Ang,** *Loft 69*, 2014

Peter Ang

3DArtistonline

Username: cgdigi

Personal portfolio
www.dartofang.com

Country Australia

Software 3ds Max, V-Ray, Marvelous Designer, Photoshop, After Effects

Work in progress...

Mohamed Abdelfatah

3DArtistonline

Username: mabdelfatah

Personal portfolio www.mabdelfatah.artstation.com

Country Egypt

Software ZBrush, 3ds Max, MARI, V-Ray, Photoshop

Work in progress...

> This character was created for a personal short cinematic, based on an initial concept I made over a year ago. It took me about 45 days to achieve the result you see in the final image

Mohamed Abdelfatah, *Faris*, 2014

Kontorn Boonyanate

3DArtist online

Username: Dongkont

Personal portfolio www.facebook.com/dongkontart

Country Thailand

Software ZBrush, KeyShot, Photoshop

Work in progress...

"I love both art and biology, so I decided to portray a combination of the two subjects through sculpture. The concept and inspiration for this piece was from the idea for the classification of animal kingdoms"

Kontorn Boonyanate, *Amphibian*, 2014

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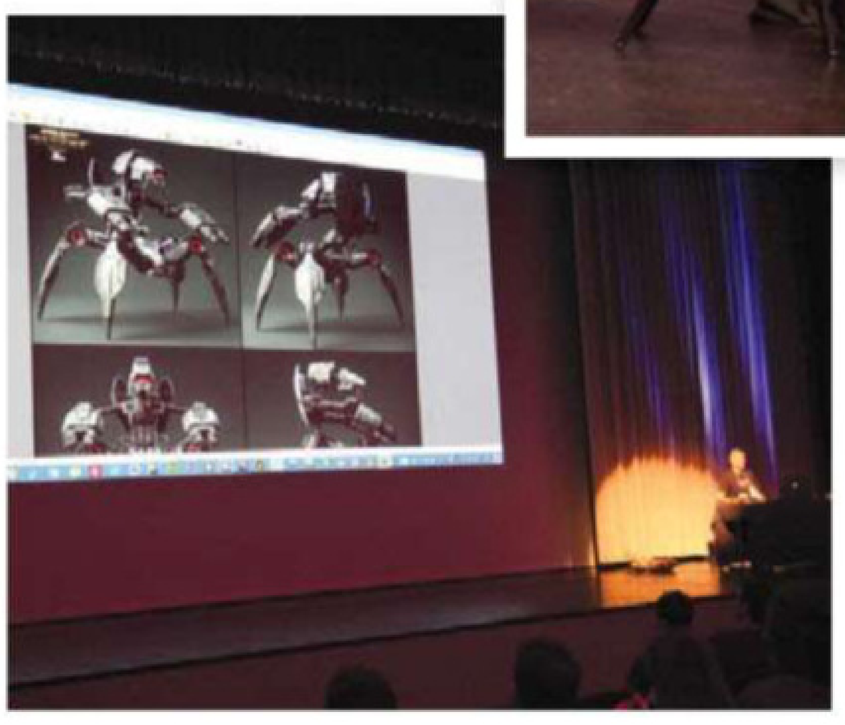
Trojan Horse Was a Unicorn

This year's Trojan Horse Was A Unicorn, billed as 'Burning Man meets TED', really cemented its place on the events circuit

A coming-together of professional artists, industry veterans and an unabatedly inspired tribe of budding artists, Trojan Horse Was A Unicorn is a four-day art event held on a stunningly beautiful peninsular in Tróia, Portugal. Now in its second year, THU has become an increasingly diverse global gathering, having taken the decision to expand the tribe from 150 to over 400, migrating from 42 different countries. This is in-part due to founders Andre Luis and Ines Silva inviting industry veteran Scott Ross to take an ambassadorial role and bring his experience, advice and contacts to the fledgling event. At its core, THU is pared down to one simple idea; it's driven by artists. "There are no VIPs and no superstars – everyone is here to share how to survive in a digital world," enthuses Luis.

Three-hour daily workshops kicked off a packed schedule each day, starting at 8am. Choices included clay-sculpting



MAIN Over 400 artists from 42 countries descended on Tróia, Portugal for the second THU event

TOP Ambassador for THU and industry veteran Scott Ross shared a fireside chat with Syd Mead

LEFT The event hosted a wealth of guest speakers, from freelance artists to The Mill, Pixar and ILM

> There are no VIPs and no superstars – everyone is here to share how to survive in a digital world
>
> **Andre Luis**

classes with Alex Oliver, or Gnomon, Foundry and Next Limit learning sessions. The popularity of the workshop sessions clashed somewhat with the desire to keep the groups small and informal, so those that applied were chosen at random. Anyone not selected was instead free to brush up on drawing skills with drop-in tutored classes featuring Suicide Girls models. Early-evening mentorship sessions that gave the opportunity to show and discuss your portfolio with chosen guest artists were similarly run.

In terms of guests, the organisers really pulled out all the stops and brought together a line-up to rival much larger events. High-profile guest speakers from Pixar, ILM, The Mill, Bioware, Gnomon, Blizzard and more joined a host of talented freelance artists to deliver an engrossing series of presentations that ran on until midnight every night. It wasn't all work, though, as late-afternoon happy hours consisting of free beer and snacks gave the tribe time to catch up with each other's endeavours. Once the talks concluded, it was straight to the casino for many, where Wacom Art Battles were fought and projected onto the casino walls.

Overall, THU was a resounding success that is a huge credit to its brilliant organisers. Our only gripe was with the very unseasonal weather, which prevented the planned fireside chats from taking place on the beach, and were instead held indoors. Tickets for 2015 will be capped at 500, so you'll need to be quick to get Trojan blood in your veins and become a member of the tribe.

TOP Throughout the day attendees had the option to attend clay-sculpting classes or hourly life-drawing classes, in which Suicide Girls models posed

LEFT, BOTTOM Alessandro Baldasseroni provided clay-sculpting workshops and demonstrated his techniques to create effective and realistic moulds of human figures

The future of THU

Putting together a well-organised event is not just great achievement, but also a never-ending task. As the sunset began on THU's final day, the tribe gathered for its closing ceremony to hear tantalising glimpses about what's envisioned for the next iteration. "I'm working to further improve the event," explains Andre Luis. "We have been listening to the speakers, sponsors and attendees and we know already what we have to change – better communication, more hours of live demos and workshops to create a better experience. We understand that we need to mix better an inspirational path with hands-on skills; learning by seeing and doing." Other aims include a larger recruitment fair, improvements to the workshops and mentorship sessions, which will also be expanded in group size, and an overall increase in the number of guest speakers. An increase in the number of games industry speakers is also on the cards. "This addition is about giving the speakers list a better balance, so the attendees can have more choice." Taking advantage of the surroundings, Portuguese food will be more readily available to the tribe. "We are always worried about all aspects of the attendees experience and food is obviously important too."

'MONSTRO!' is rendered all in one pass without render layers. Everything was rendered at once, including motion blur and depth of field

01

02

03

MONSTRO!

'MONSTRO!', a new ten-minute short animation by Chris Romano and Side Effects Software, showcases Houdini's flexibility as an all-encompassing toolset

Writer and director Chris Romano's latest animated short 'MONSTRO!' tells the story of a scientific expedition down the Amazon river to a dark lagoon in search of a mythical creature. The idea came about after Romano pitched the notion of collaborating to Side Effects Software's Kim Davidson who, familiar with his work, gave the thumbs up. The goal for the project was to create an animation that offered young Houdini artists a chance to create production-level work for their reels, but without the burden of industry deadlines.

The inspiration for the creature stemmed from rewatching old episodes of *Sigmund And The Sea Monsters*, spurring the desire to write something about Gill-Man. "It took almost four years to complete and we used Houdini for just about everything," explains Chris. "For reasons of economy, each shot is rendered in a single pass (except for an intentionally bad green-screen moment). There's no compositing of layers. Everything is in-camera, including deformation, motion blur and depth of field. That includes all of the water and smoke FX. Those elements are rendered right along with everything else."

Having everything in one package removed any problems that can occur when swapping between tools. "It allowed us to build a really solid pipeline using Digital Asset Technology, and easily set up a Project Directory that could be used between various locations," producer Alex Czetwertynski explains. "Between Chris, myself and Side Effects, the project was always in sync. We could model, shade, animate, render and create powerful simulations within the same package with amazing tools along the way, which was empowering."

Fresh out of Drexel University, animator and rigger Evan Boucher heard of the internship from Side Effects. "It was encouraging [that] the internship would have a set purpose, with a unique short film to be able to show off at the end of it." For Boucher, the biggest challenge to overcome was rigging. "I designed the face system for the characters. It was pretty simple, but came about after personal tests with a more robust system. For example, since Houdini didn't natively have anything analogous to Maya's Set Driven Key system, I used CHOPs in Houdini to create some expressions that would work in a similar manner in order to drive Blend Shapes on and off."

Edward Mann joined after completing Animation Mentors' Character Animation program. "Houdini is not traditionally known as an animation package and I came to it from a strictly Maya background. Getting used to the node-based workflow was a real mindbender at first, but once I acclimated it was nice. I remember needing to do something with one of our character rigs that it was not at all designed to do. It was close to the end of production and the rigger said 'no big deal'. I had new features added to the character within a couple days without needing a brand new rig."

Already a Houdini FX intern at Side Effects, Sarah Seung-ah You provided effects work for hair, smoke, water and particle effects. The Houdini Wire Solver was used for hair dynamics. Once setup was completed, hair dynamics were created by changing the animation data for each shot and character.

01 It took the team almost four years to complete the short and they used Houdini for just about everything

02 Side Effects observed the team as they worked with Houdini's character tools and has since used their feedback to plan improvements for future versions of the tool

03 Fetch and Parenting tools were used to grab objects from within various Subnets, which was helpful for character interaction with both props and environments

Create the stop-motion look

To create the stop-motion aesthetic in 'MONSTRO!', several techniques were used. As with traditional stop-motion animation, the short was animated at 12 frames per second. Depth of field was kept short and the scale of the texture details large, which helped make everything appear smaller. "My original plan was to have it look even more like stop-motion, but I found myself having to let go of some strategies," Romano explains. "I actually thought that I hadn't gone far enough, but I was happy to settle on a hybrid look – I mean, the animation is motion-blurred unlike stop-motion." The motion blur was cut in half to a 0.25 shutter, which gives a softer strobing effect. "I still gave it three to five samples of centred motion blur, so you can see little 'V' blurs when the action is fast." Lead FX artist Sarah Seung-ah You used Houdini to give detail to the world and to enhance the stop-motion feel of the short.

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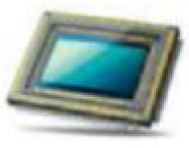

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Images of the month

These are the illustrations that have been awarded 'Image of the week' on 3DArtistOnline.com in the last month

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A The Forgotten House

» Tamas Medve

3DA username m3dve

Tamas says: "One of my favourite TV series is *True Detective*. I decided to make an image based on it, where you can hear the wind blowing the leaves and you feel that some scary things were going on in the past..."

We say: *Tamas has done a really fantastic job of emulating the tone and aesthetic of HBO's superb show with this haunting project. At once both ominous and enigmatic, this artwork has been brilliantly realised, and we fell in love with it straight away.*

B Sinbad

» Duncan Foster

3DA username Duncan Foster

Duncan says: "My interpretation of the iconic hero from Persian folklore. I tried to veer away from a combat-driven design and based the design around his intelligence and charisma instead."

We say: *The muscle definition and the rippling effect that dominates the character's trousers are what really stand out here, as a lot of care has been taken to create cartoon-based imagery with a realistic edge. The character has a real sense of personality too, with that gaze into the distance.*

C Space Admiral

» Tom Parker

3DA username Crazyfool

Tom says: "I usually work on high-poly assets for games, so wanted to brush up on my real-time texturing, with a large emphasis on design, low-poly hair, skin shaders, and material definition within Marmoset Toolbag 2, a real-time PBR renderer."

We say: *Tom has done a great job with this project – we're big sci-fi fans, and would love to see more of this character. This is photorealism at its best, with considered lighting adding greatly to the quality.*

D Taxi Light On Car

» Stéphane Suini

3DA username S-Suini

Stéphane says: "This image represents the very first French taxi light on a vintage Renault car. The taxi light was originally made in 1954. This image was modelled with 3ds Max and rendered with Octane Render."

We say: *Simplicity and elegance are at the heart of Stéphane's piece, highlighting the idea that correctly utilising bold colours, crisp models and stark composition can be just as, if not more, effective than a highly intricate image.*

Image of the month

The Dirty Ball

» **Pasquale Scionti**

3DA username sciontidesign

Pasquale says: "I made this image in Cinema 4D and Maxwell Render Engine. I wanted to create a photorealistic look."

We say: *Textures are key here, with the rust on the faceguard and scratches on the bat adding to the image's simple charm. It's a great example of photorealism and a strong image overall.*

White & Wood

» **Simone Manna**

3DA username nexzac

Simone says: "I modelled this scene months ago, when version 1.8 of V-Ray for Cinema 4D was first released. The image was made with Cinema 4D, V-Ray and Photoshop."

We say: *This represents a pretty idyllic home environment, and one that we'd be pretty pleased with ourselves! The attention to detail is superb, with the texture of the floorboards a particular highlight.*

Lamborghini

» **Jorge Adrián Fernandez**

3DA username Jorge fernandez

Jorge says: "This is a personal work of a Lamborghini. The tools I used were in 3ds Max."

We say: *The most impressive facet of Jorge's image is the masterful use of reflections that give it a sense of context.*

Flower

» **Joe Friedel**

3DA username infinitux

Joe says: "I created this abstract artwork using Blender and its new Cycles shading engine. I have been creating digital artwork for about 15 years. It's something I get a lot of enjoyment from."

We say: *Balancing colours can be difficult, but Joe has done it to great effect, creating a dusky, artistic image that would work just as well as a canvas print.*

MASTER THE ELEMENTS

With Bifröst set to revolutionise the industry, experts show you how to create environmental effects in Maya

Seeker by Furio Tedeschi

If there's something anyone – from a lead character artist to a senior game cinematics animator – can agree on, it's Maya's universal appeal. "It's not quite to the level of Photoshop, but it's getting there," begins Eric Keller, author of *Maya Visual Effects: The Innovator's Guide* and Gnomon School of Visual Effects instructor. Flexible enough that a range of professional artists use it daily, while also user-friendly enough for beginners, the idea of Maya truly becoming a default tool – the 3D version of Photoshop – is appealing, and not just to Keller.

There was one area, however, in which Maya was falling behind. "It's hard to re-create the level of procedural FX in Maya that you can in Houdini," says Chris Puchta, a senior FX artist with more than ten years of experience in the industry. "Houdini's node-based approach is better geared to creating complex effects that build upon each other, without having to change the system as the input changes. This approach and its fluid, liquid and rigid-body solvers make it a stronger tool for high-end effects."

"TDs who want to extend the [Maya] toolset for a specific effect need to be comfortable with scripting in MEL or Python, and possibly writing a custom C++ plug-in if needs be," adds Dan Warder, a senior FX technical director at Passion Pictures. "This is good for skilled TDs, but it can be quite daunting for newcomers to the software."

This year, everything changed. For the first time, users were able to experience the initial results of a brand new project set to alter Maya FX forever. It all began in 2012, with a small company called Exotic Matter and its fluid simulation system, Naiad.

"I started Exotic Matter back in 2008 and we developed a product called Naiad, which was used on some major movies, such as *Avatar*, much of Framestore London's work, and by Rhythm & Hues," remembers Markus Nordenstam, now a product manager at Autodesk. "It was taking the industry by storm and I became this fledgling entrepreneur and then I guess Autodesk decided that instead of trying to compete, they would just acquire us, which they did, and I came to Autodesk through the acquisition." When the acquisition eventually took place, a statement from the company read that it was all 'in an effort to accelerate Autodesk's research and development of simulation technologies for visual effects'. The result, shown at Anaheim during SIGGRAPH 2013, was Bifröst.

Like the name suggests – according to Norse mythology, a rainbow bridge between the world and the realm of the gods – Bifröst is a way to connect several technologies, bringing together both Naiad and the recently retired Softimage's node-based visual-programming platform, ICE, to allow users to easily create incredible effects. Able to work as both a separate standalone system and within Maya itself, Bifröst is currently only capable of fluid simulation with rendering through mental ray, but the team has big plans for expansion.

Aimed at FX TDs and developers, objectives over the next few years include an exposed procedural graph that would allow much more control over solvers and order of operation, as well as encapsulate everything from fluid effects to Bifröst procedural modelling, rigging and animation. Also planned is compatibility with a larger variety of renderers, the ability to write custom C++ nodes and utilise the full Bifröst API and aerodynamic simulation in the form of smoke, fire, and explosions that has just begun a beta testing phase.

"What I look forward to the most," continues Nordenstam, "is just getting to the point where in the next five years, anyone who needs to do big effects or crazy effects thinks 'well, I'll just do it in Bifröst'. I think it will revolutionise Maya."

With new announcements – such as Houdini Engine allowing Side Effects' high-end procedural workflows to find a home in Maya and Bifröst – appearing every day, we asked industry experts what the new platform can do and how other solutions compare today to create smoke, fire, wind and water in a piece of software set to become more powerful than ever before.

"WHAT I LOOK FORWARD TO MOST IS JUST GETTING TO THE POINT WHERE IN THE NEXT FIVE YEARS, ANYONE WHO NEEDS TO DO BIG OR CRAZY EFFECTS THINKS 'WELL, I'LL JUST DO IT IN BIFROST"
Marcus Nordenstam

THE EXPERTS

MIHNEA BALTA
www.nextlimit.com
RealFlow/Maya plug-in developer

DIONYSIOS BOULOUTZAS
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FX TD at MPC in London

ADRIAN GRAHAM
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Principle user experience designer at Autodesk

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www.BeezleBugBit.com
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MARCUS NORDENSTAM
www.autodesk.com
Product manager at Autodesk and co-author of Naiad

TIMUCIN OZGER
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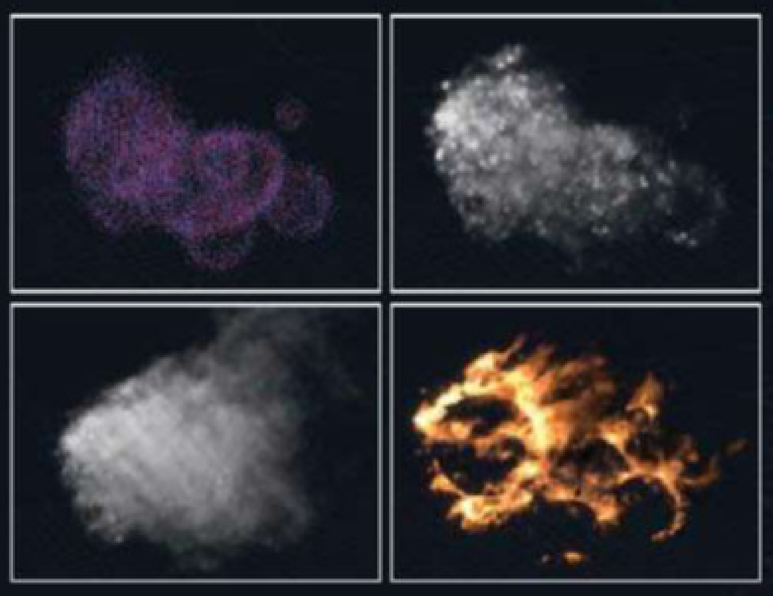
Senior Houdini/Maya FX technical director

CHRISTOPHER PUCHTA
www.christopherpuchta.com
Senior FX artist based in London, UK

DAN WARDER
www.djwarder.co.uk
Senior FX TD for film, television and commercials

ANDREW WONG
www.sidefx.com
3D software developer at Side Effects Software

Master the elements



Dionysios Bouloutzas

FIRE

As with every piece of FX, the first step is to look for reference, deciding how this element should look in the specific sequence, depending on the substance that is being burned as well as the environment.

When starting fire effects in Maya, block out the emission on a basic level using particles. This can be done by emitting the source particles straight from the asset that is being burned, combining a Texture map, adding basic collisions with any close object and a short lifespan to get a great source for Velocity, Temperature, Density and Fuel to be passed onto a Maya fluids container.

For the fluid part of the effect, be sure to spend time on the behaviour of the simulation by playblasting Temperature and Density respectively while previewing the velocities to get an understanding of the movement of the voxels.

Tweak the Dissipation of the Temperature to Density and adjust their attributes (high values of Buoyancy and Dissipation, some Swirl and Turbulence) as well as the Opacity shading to get a realistic behaviour of the fire in terms of the speed, overall shape and motion.

Using Fuel and Temperature along with Density gives you additional control for the behaviour of the flames over time. I will usually start launching frame renders while playing around with the Color and Incandescence ramps along with the Texturing attributes to get the look I want, using the grid co-ordinate methods in the Texture section to add the extra structures or shapes.

When rendering fluids, use Maya's render layers to get different passes of the FX with overrides on the opacity and colouring of the simulation. For a fire effect, create a pass with tight and brighter flames, the main fire pass and a smoke pass for when the simulation fades out.

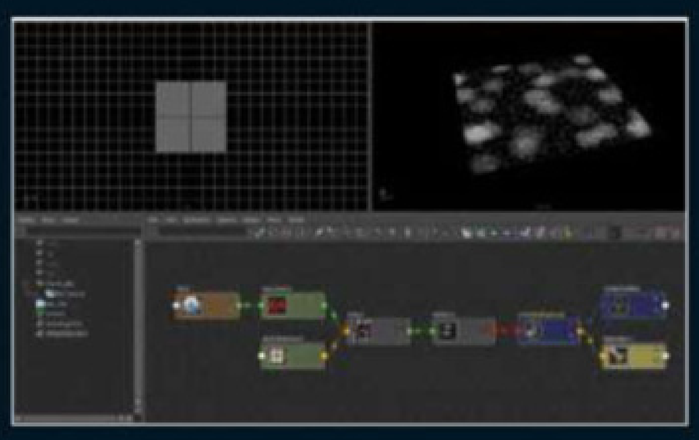
One thing to always keep in mind is how the compositing will complement the final result – subtle glow and colour correction always help the FX to integrate with the surrounding elements and backplate to look realistic.

Lastly, depending on the material that is supposed to be burning, add secondary simulations like sparks and ash that get affected by the fire fluid (which can be used as a dynamic field for particles), wrapping up a multi-level FX inside of Maya.

On the right you will find my guidelines for creating convincing fire effects by using Maya Fluids.

For this effect I wanted to create strong, wind-blown fire with dense smoke – this is always much more impressive than a campfire! By increasing the resolution of the container you can create changes, such as longer smoke or quickly dissipating smoke, with exactly the same parameters compared to the last simulation.

To do this, connect the Emission attributes to a Shader, which will be offset based on scene time. This way we have a constantly changing source. It adds those smaller, extra details and randomness, which always exist in real life.



The other addition we can make is to add a lot of Temperature Turbulence. Where there is heat, there will be a lot of turbulent velocities. All these parameters are going to help break that mushroom look. In the case of fire, we can also use a really high number for Temperature Dissipation, which makes the fire and smoke differ from each other sharply. This really helps to boost the simulation's realism.

I also always use a little touch of Pressure and Threshold values under the Temperature tab. This adds little explosions or expansions within the simulation. In the accompanying box you can see some of my parameters, used for this specific simulation. If not mentioned, they may have been left with default values.

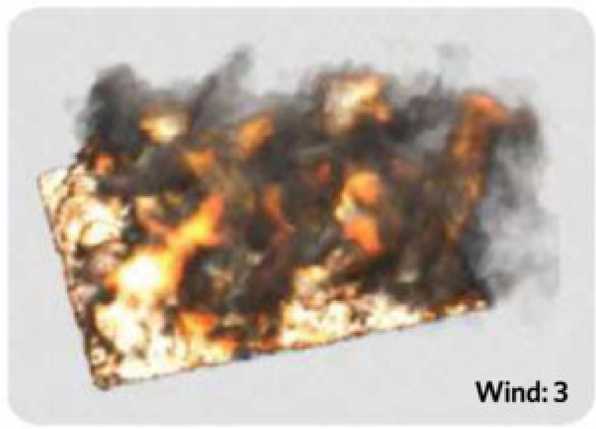
"GLOW AND COLOUR CORRECTION HELP THE FX TO INTEGRATE WITH THE SURROUNDING ELEMENTS AND BACKPLATE TO LOOK MORE REALISTIC"

Dionysios Bouloutzas

TAME MAYA FLUIDS FOR FIRE

Timucin Ozger's values for incredible fire effects

ALL GRIDS ARE DYNAMIC	
Damp	0.010
High Detail Solve	All Grids
Substeps	1
Solver Quality	40
TURBULENCE TAB	
Strength	0.25
DENSITY TAB	
Density Scale	1
Buoyancy	0.1
Dissipation	0.5
Diffusion	0
TEMPERATURE TAB	
Buoyancy	15
Pressure	0.01
Pressure Threshold	0.1
Dissipation	0.2
Diffusion	0.01
Turbulence	4.0
Noise	0.1
VELOCITY TAB	
Swirl	5
Noise	0.01
FUEL TAB	
Reaction Speed	0.2
Air/Fuel Ratio	5



Wind: 3

Wind: 10

WATER

CREATE OCEAN WAVES IN 8 SIMPLE STEPS

Adrian Graham

In order to simulate waves, we need to create a pool to contain the simulation and fill it with static liquid. Now add collision objects, known as colliders, such as the beach or rocks to the scene.

Waves are generated by pushing the water towards the shore with a variety of colliders and fields (known as accelerators). These objects cycle the same animation to get the water moving. The base simulation should then be cached to disk.

01 This image shows the Emission and Collision geometry. The blue geometry is the initial liquid emission volume. The green geometry is the paddle that pushes the liquid and creates waves.

02 As you can see, this screenshot shows the initial liquid emission, displayed in particles.

03 The liquid, simulated to frame 443. Note the collision with the ground plane and rocks. Next, create a Foam object and attached it to the liquid simulation. Set the Emission parameters to generate foam depending on variables, such as the Speed, Curvature or Vorticity of the underlying liquid. The foam is then cached to disk.

04 The simulation at frame 443, but with the particles' Color and Opacity driven by their Vorticity, or the fluid's Rotational Movement.

05 Foam emitted from the liquid simulation, based on a number of factors (Velocity, Vorticity, Curvature and so on).

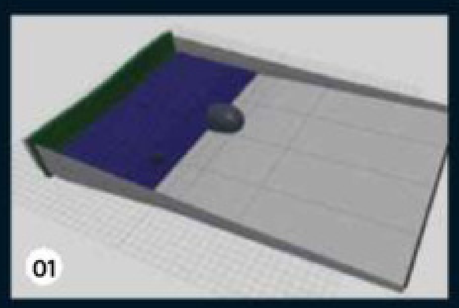
06 This image shows the liquid simulation converted into a polygonal mesh.

07 Both the meshed particles and the particles themselves shown together. At this point, you can scrub the timeline of the animation, reading cache data for both the liquid and foam. Choose a frame and perform a hardware render. What you see in the renders is what you see in the Viewport.

08 All layers shown, with lights, shadows and a visible ground plane.

"FLUID-WISE, I'M A FAN OF A PARTICLE-BASED APPROACH, MEANING THAT FLUIDS AND FLUID ATTRIBUTES ARE EMITTED BY PARTICLES INSTEAD OF USING GENERIC OR SURFACE EMITTERS"

Chris Puchta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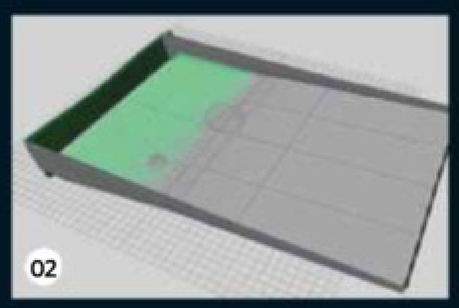
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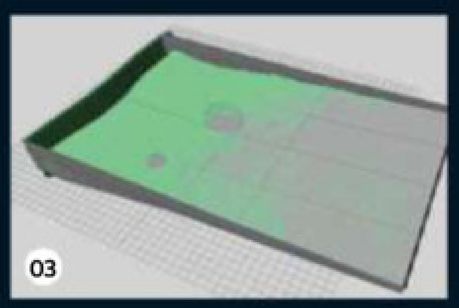
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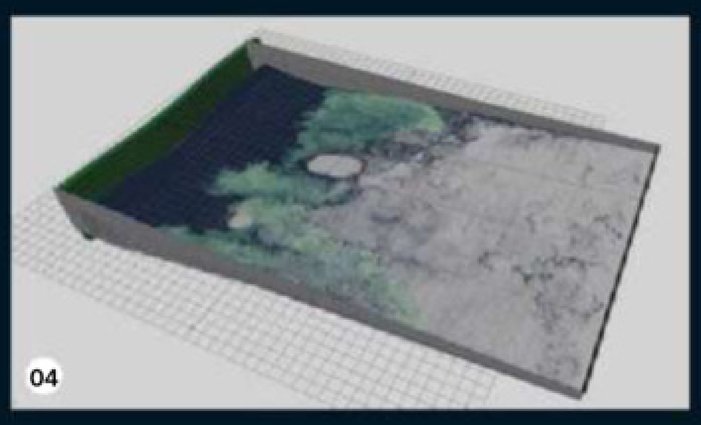
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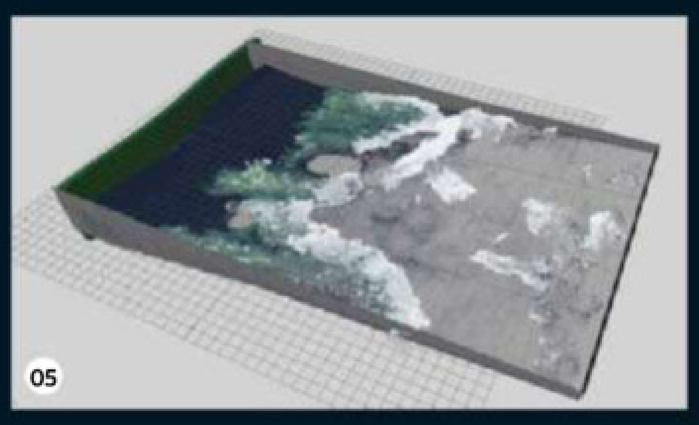
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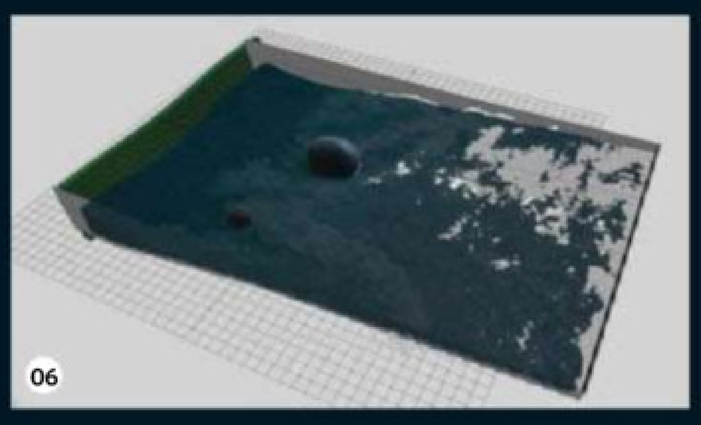
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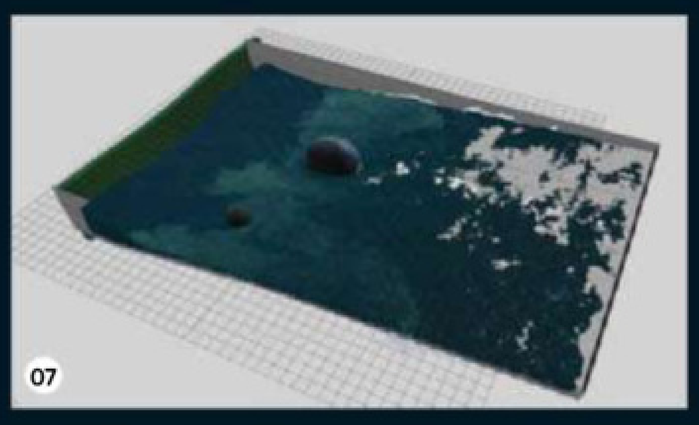
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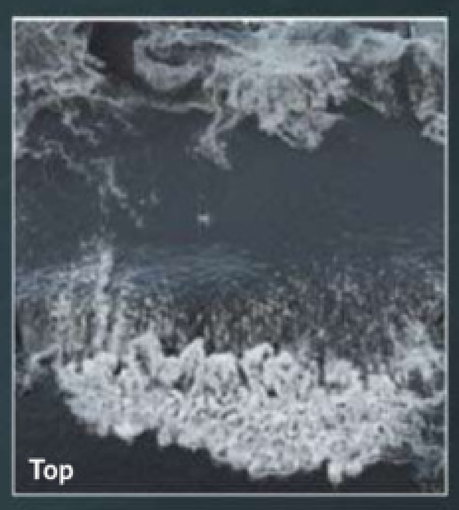
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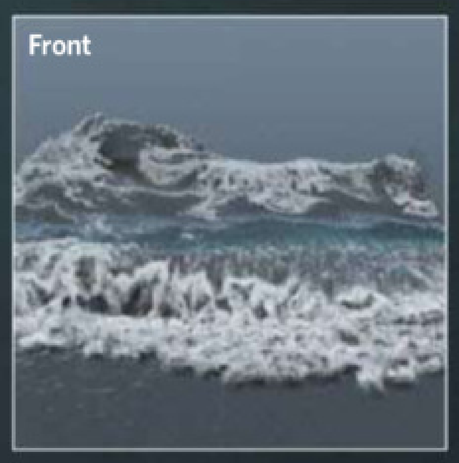

Front

Master the elements

WIND

MAKE A TREE IN A GUSTY WIND

Eric Keller

Select the tree stroke OakAutumn1 node in the Outliner. Choose Modify>Convert Paint Effects To Polygon. You will see that this creates a group called oakAutumn1meshGroup.

Select the oakAutumn1meshGroup and switch to the Animation menu set. The next step is to choose Create Deformers>Non-Linear>Bend to add a Bend Deformer into the scene. Next, select the bend1Handle. In the Channel box under the Inputs section, set the Curvature to 80 and Low Bound to 0. Use the Move tool to move the Bend Handle so that the tree bends directly from the base of the trunk.

Animate the Curvature setting to create the effect of a strong wind blowing the tree. Don't overdo the Curvature amount though; values between 0 and 30 should be plenty. This creates the large-scale deformations.

The tree probably moves in a rubbery way. To add more of a rustling quality, select the strokeAutumn1 node. In the Attribute Editor select the oakAutumn1 tab. At the bottom under Tubes>Behavior>Turbulence, set Turbulence Type to Tree Wind. Adjust the Turbulence, Frequency and Turbulence Speed settings until you get something you like. Make a playblast to see the effect at the proper speed.

Ctrl/right-click over the tree trunk and choose Vertex to switch to Vertex Selection mode. Select ten to 20 vertices randomly within the branches. With the vertices still selected, switch to nDynamics and choose nParticles>Create nParticles>Emit from Object>Options. Set the Emitter type to Surface, Rate to 10, Speed to 1 and Speed Random to 5. You can adjust these settings if you need to later on. Press Create to make the nParticle Object. Play the scene and the tree will emit large, coloured balls.

In the nParticle tab of the Attribute Editor, set the Lifespan Mode to Random Range, Lifespan to 1 and Lifespan Random to 1. Under the Shading tab, set the Particle Render Type to Points, the Point Size to 3 and the Color to red (just so that you can see them). In the Dynamic properties, switch on Ignore Solver Gravity.

Select the nParticle and choose Fields>Volume Axis, scale the field up so that the tree fits inside with some extra room. The Volume Axis field has the best options for creating interesting turbulence. In the Attribute Editor set Away From Center, Around Axis, and Along Axis to 0. Set Directional Speed to 6 and set Direction to match the direction of the tree bend – probably a 1 in the X Axis or Z Axis slot. Set Turbulence to 1 and Turbulence Speed to 0.2. These settings will need to be adjusted to shape the motion of the leaves flying off the tree.

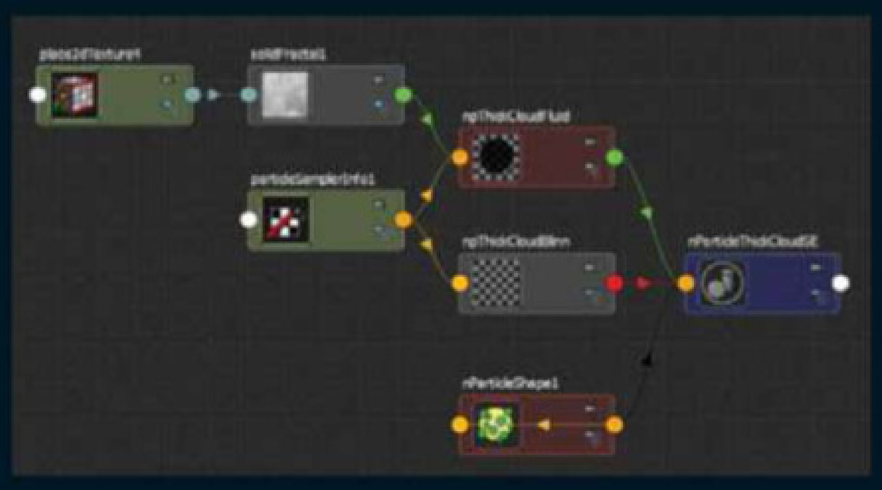
Expand the oakAutumn1Main node (the polygon tree trunk) and adjust the emitter Rate so that the tree is not sending off too many or too few particles. You may want to set key frames on rate to match the motion of the tree a little better so that more particles fly off as the tree bends.

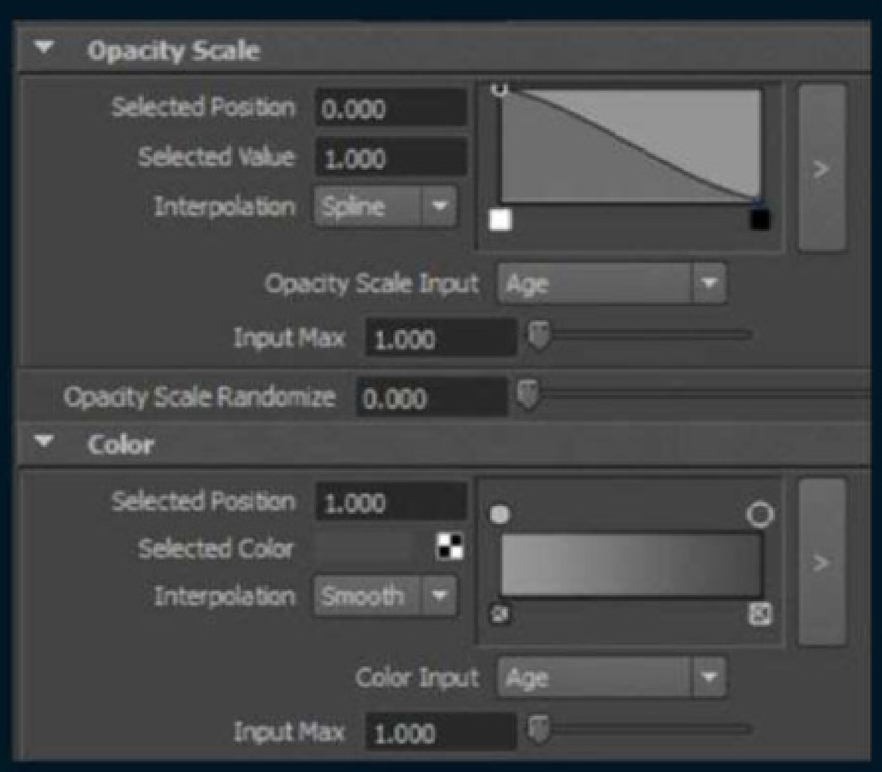
Create a small polygon plane with some bends in the surface. Name it Leaf and assign the same shader that is applied to the tree leaves to this polygon plane, then move the pivot of the plane to match the stem of the leaf.

Select the Leaf surface, Shift+select the nParticle and choose (from the nDynamics menu set) nParticles>Instancer (Replacement).

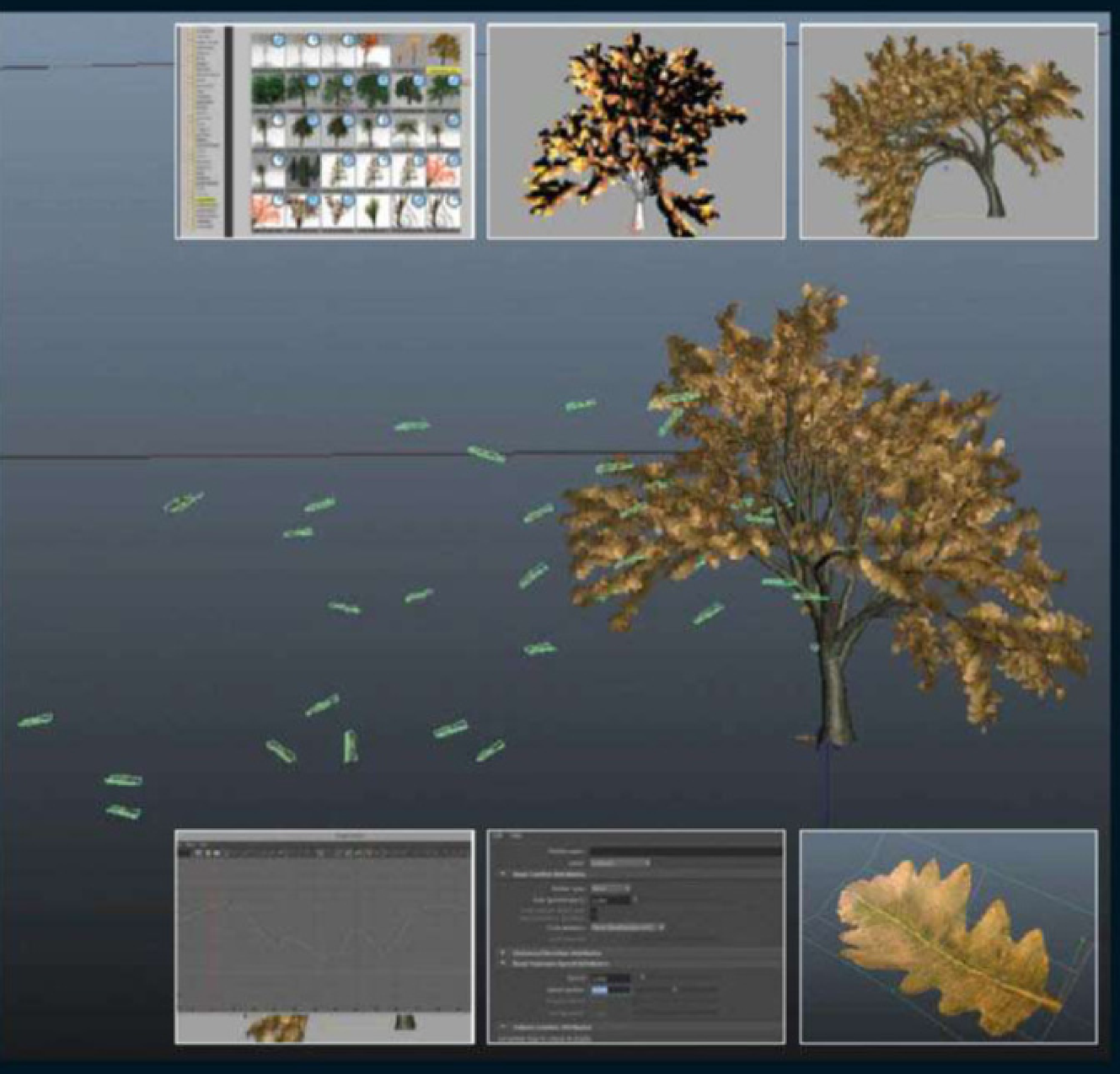
To make the leaves tumble, select the nParticle. In the Attribute Editor under Instancer (Geometry Replacement) go to Aim Position>Acceleration. You'll get better results if you add custom attributes and expressions, but this is an easy way to vary the rotation of the leaves.

Tweak the settings on the Bend Handle, the nParticle Emitter and the Volume Axis Field to finetune the effect. Set the Opacity of the nParticle to 0 to hide the original nParticles.





LEFT Completed Thick Cloud nParticle smoke
TOP Completed Thick Cloud shading network, as seen in the Node Editor
ABOVE Adjusted nParticleShape1 Opacity Scale and Color ramp graphs



TORNADO WALKTHROUGH

Timucin Ozger

After I completed a rig for the tornado with Bend Deformers, Skeleton rigs, constraints and so on, I started planning out the particle system.

I wrote a little script to make particles run down the base shape of the tornado and go around it by using the UVs of the surface. This way I could control how fast the wind swirls and climbs up and down, which is based on linking UVs as goal positions with creation expressions.

These particles were used for emitting the main smoke effect. I have also added several forces to keep the tornado wind in the centre and gave them some Swirl forces. After several tests, I believed the particle system was going to be sufficient so I cached all the particle layers and started testing parameters for Maya Fluids, such as Dissipation and Turbulence values. I then linked most of these attributes to a Null to make easier iterations.

You can find the video of particle system at **www.vimeo.com/59057026** and the resulting fluids at **www.vimeo.com/54135009.**

SMOKE

MAKE A COLUMN OF SMOKE

Lee Lanier

In a new scene, choose nDynamics>nParticles> Create nParticles>Thick Cloud and nParticles> Create nParticles>Create Emitter. An emitter is made with an nucleus and nParticle node.

Open the nucleus1 node in the Attribute Editor and reverse the Gravity Direction by changing Gravity Direction to 1.0. Open the nParticleShape1 node. In Dynamics Properties, deselect Ignore Solver Gravity. Extend the timeline, play back from frame 1 and the nParticles should waft upwards.

Open the Hypershade window. Note that the nParticles are assigned to a Surface material (npThickCloudBlinn1) and a Fluid material (npThickCloudFluid1). As long as the nParticleShape node's Surface Shading attribute in the Shading section is set to 0, only the Fluid material is used to determine the Surface Shading quality of the nParticles. Test render with Maya on a later frame. Each nParticle should appear puffy and cloud-like, yet they will all be identical.

Return to the nParticleShape1 node. In the Lifespan section, change Lifespan Mode to Random Range. This allows you to take advantage of age-driven attributes. Play back from frame 1 and stop on a later frame. Expand the Shading section. Insert an additional point into the Opacity Scale ramp graph so that the graph forms a downwards slope. Change the left point of the Color ramp graph to light grey. Insert an additional point at the right side of the Color ramp graph so it runs from grey to dark grey. Change the Interpolation menus for all the points to Spline to smooth the transitions between values. Render a test. Because the Opacity Scale Input and Color Input menus are set to Age, the nParticles' opacity and colour will change as they grow old, with the left side of the graphs associated with their birth and the right side of the graphs associated with their death.

To further merge the nParticle mass, open the emitter1 node in the Attribute Editor and raise the Rate to 400. Return to the nParticleShape1 node. In the Particle Size section, increase the Radius value to 0.75. Add an additional point to the Radius Scale ramp graph and alter the graph so that it creates an upwards slope from a value of 0.5 to 1.0. This causes the nParticles to increase in size as they age. Play from frame 1 and the smoke appears thicker.

Open the npThickCloudFluid1 material in the Attribute Editor. In the Shading section, Ctrl/ right-click over the Transparency attribute name and choose Break Connection. Click the chequered map button beside Transparency and choose the Solid Fractal texture from the Create Render Node window. This forces the fluid material to use a 3D noise to determine the opacity of the material. As such, the noise pattern does not repeat on each nParticle and the nParticle mass becomes more irregular. To help prevent small, opaque blobs from appearing at the edges of nParticles, return to the npThickCloudFluid1 material, go to the Shading section, change Dropoff Shape to Sphere, and Edge Dropoff value to 0.5. These changes taper the fluid opacity from nParticle interior to exterior.

Create one or more lights and continue to test render. You can increase the intensity of the built-in self-shadowing by changing the npThickCloudFluid1 material's Shadow Opacity to 1.0 (found in the Lighting section). To better test the smoke, change the camera's Environment Color to a sky colour. You can improve the overall quality of the smoke by slowly raising the npThickCloudFluid1 material's Shading value, found in the Shading Quality section.

There are numerous ways to improve the result by altering the attributes of the nParticleShape1, emitter1, and npThickCloudFluid1 nodes.

"BY INCREASING THE RESOLUTION OF THE CONTAINER, YOU CAN CREATE CHANGES, SUCH AS LONGER SMOKE OR QUICKLY DISSIPATING SMOKE WITH EXACTLY THE SAME PARAMETERS"

Timucin Ozger

Master the elements

ELEMENTS CREATION WITH THE HOUDINI ENGINE FOR MAYA

Andrew Wong

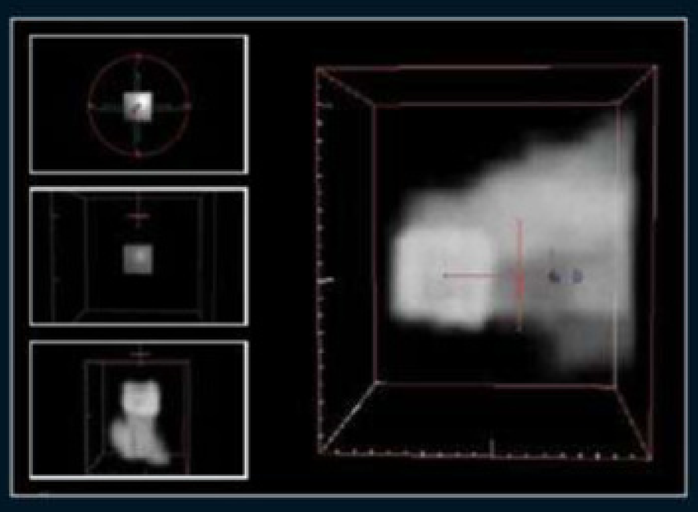
With the Houdini Engine, Maya artists now have access to a very large collection of Houdini tools, which can solve production challenges in ways that were never possible before.

Smoke / Wind

Let's say we want to emit smoke from a box, which then gets blown by wind. We can create a box from the Create>Box shelf tool. The first step to set up a fluid simulation is to create a fluid container to hold the fluid, which can be done from the Fluid Containers>Smoke Container shelf tool.

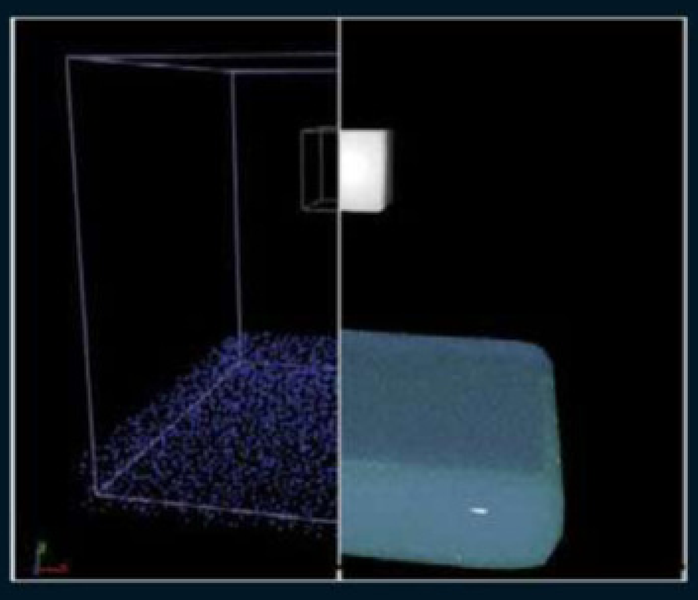
Next, we want to emit smoke from the box into the smoke container. This can be done with the Populate Container>Source From Volume shelf tool. This tool will first prompt you to select the object that we want to emit smoke from (the box), and then prompt you to select the container to emit fluid into. If you play the frames now, you'll see that the smoke is being emitted and simulated.

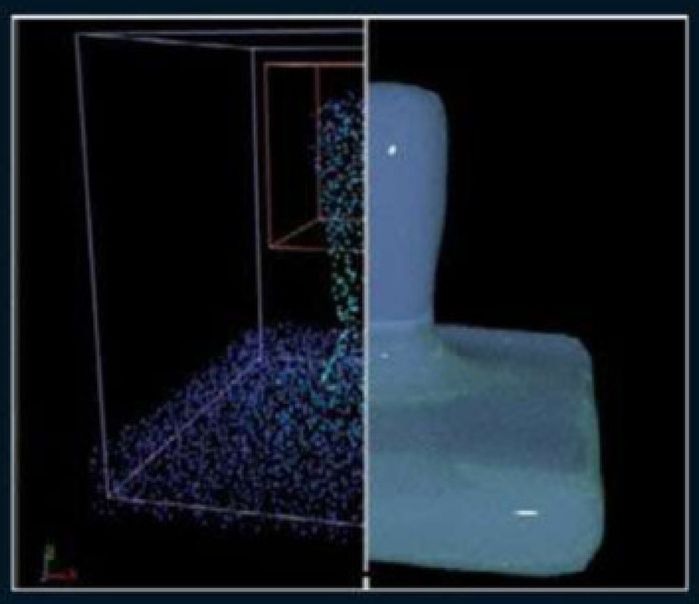
Adding wind to the fluid simulation is also pretty straightforward. We just need to use the Drive Simulation>Wind Force shelf tool, which will then prompt you to select the fluid container to add the wind force to. If you play the frames again, you'll see that the emitted smoke is now being blown to the side by the wind.



Water with FLIP fluids and Ocean FX tools

Using the shelf tools to set up FLIP fluids is quite similar to using shelf tools for smoke. First, create a box that we will emit fluids from. Then, use the Particle Fluids>FLIP Tank shelf tool to create a container tank that's filled with particle fluids.





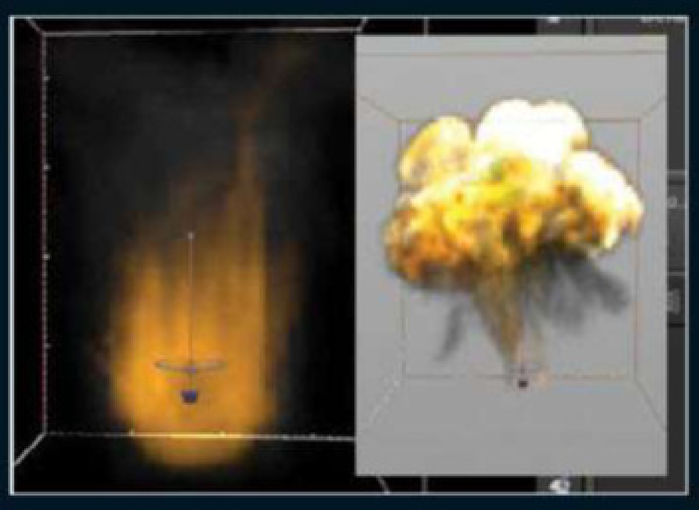
Then, use the Particle Fluids>Emit Particle Fluid shelf tool to emit particle fluid from the box into the FLIP tank. The shelf tool will first prompt for the object to source from, then it'll ask you to define the FLIP tank to emit fluids into.

If you play the frames, you'll see that fluid is being emitted from the box into the FLIP tank. If you want to try out Ocean FX, we have excellent tutorials on our website that explain how the Ocean FX shelf tools can be used to create great, realistic-looking oceans and splashes.

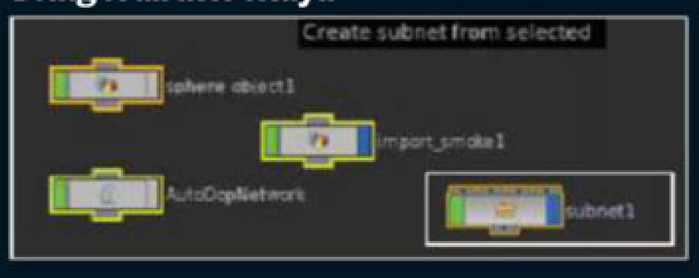
Fire with Pyro FX

While Pyro can be set up through shelf tools that are very similar to smoke (Pyro Container and Source From Volume shelf tools), Houdini has a specific Pyro FX shelf that will provide an even better starting point to create fire effects. These shelf tools are very easy to use, and they contain templates for various kinds of fire, such as flames, fireballs and candles. All we need to do is select the object to source the fire from.

Once we have some node networks that we are happy with and we want to make the functionality available in Maya, we need to package the nodes into an asset. Let's use the smoke simulation as an example. First, select all the nodes, and click the Create Subnet From Selected toolbar icon. This puts the nodes into a subnetwork, which can then be turned into an asset.



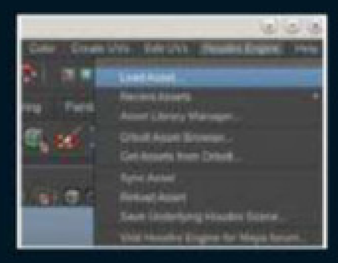
Bring it all into Maya



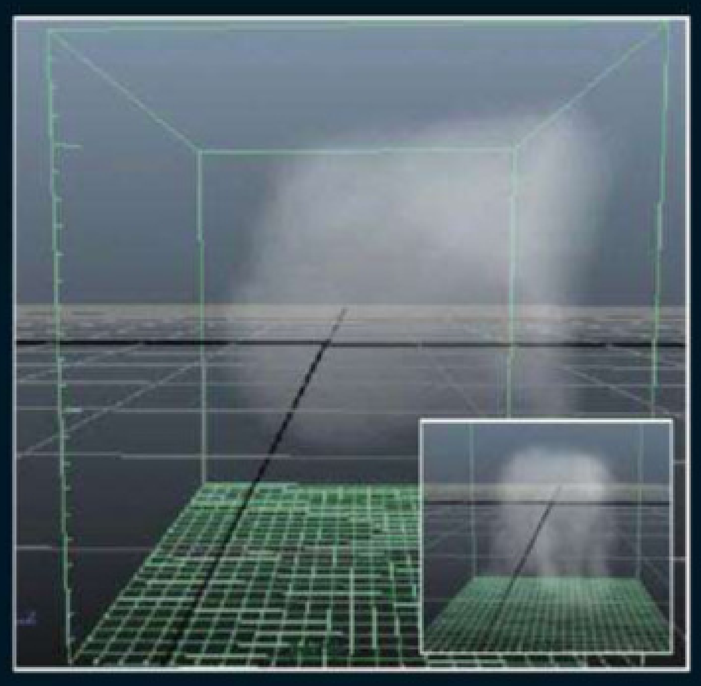
Once we have a subnetwork, we can turn this subnetwork into an asset by selecting Create Digital Asset... from the Ctrl/RMB menu. We'll then see a dialog prompting for some basic information about the asset, such as the asset's name and where to save the OTL file that contains the asset.

Once you click Accept, you'll see a dialog with lots of other properties that can be configured in an asset. The most important property is probably the Parameters tab, which allows us to adjust certain settings to affect an asset's behaviour. This can be done by simply dragging the parameters from the From Nodes list into Existing Parameters list. We can now click Accept.

Now that we have the OTL file that contains the asset, we can load the OTL file into the Houdini Engine for Maya through the Houdini Engine>Load Asset... menu.



At this point we have our smoke simulation available right inside Maya, where we also can tweak the wind velocity.



A COMPETITOR TO BIFRÖST?

Mihnea Balta considers the uses of Bifröst and the RealFlow plug-in

"Maya 2015 introduces Bifröst and XGen, which are great additions from the artists' point of view, and help close [the gap] between Maya and other, more specialised programs for dynamics and FX," explains RealFlow/Maya plug-in developer Mihnea Balta. "There isn't much interaction between Bifröst and the RealFlow plug-in, because they are both fluid solvers, so they are parallel, or you could even say competing, technologies."

The plug-in allows for any functions or animated meshes and particles generated by RealFlow to be loaded in Maya. It can also be used to export geometry and particles from Maya to RealFlow, so that they can be used as elements in any RealFlow simulation.

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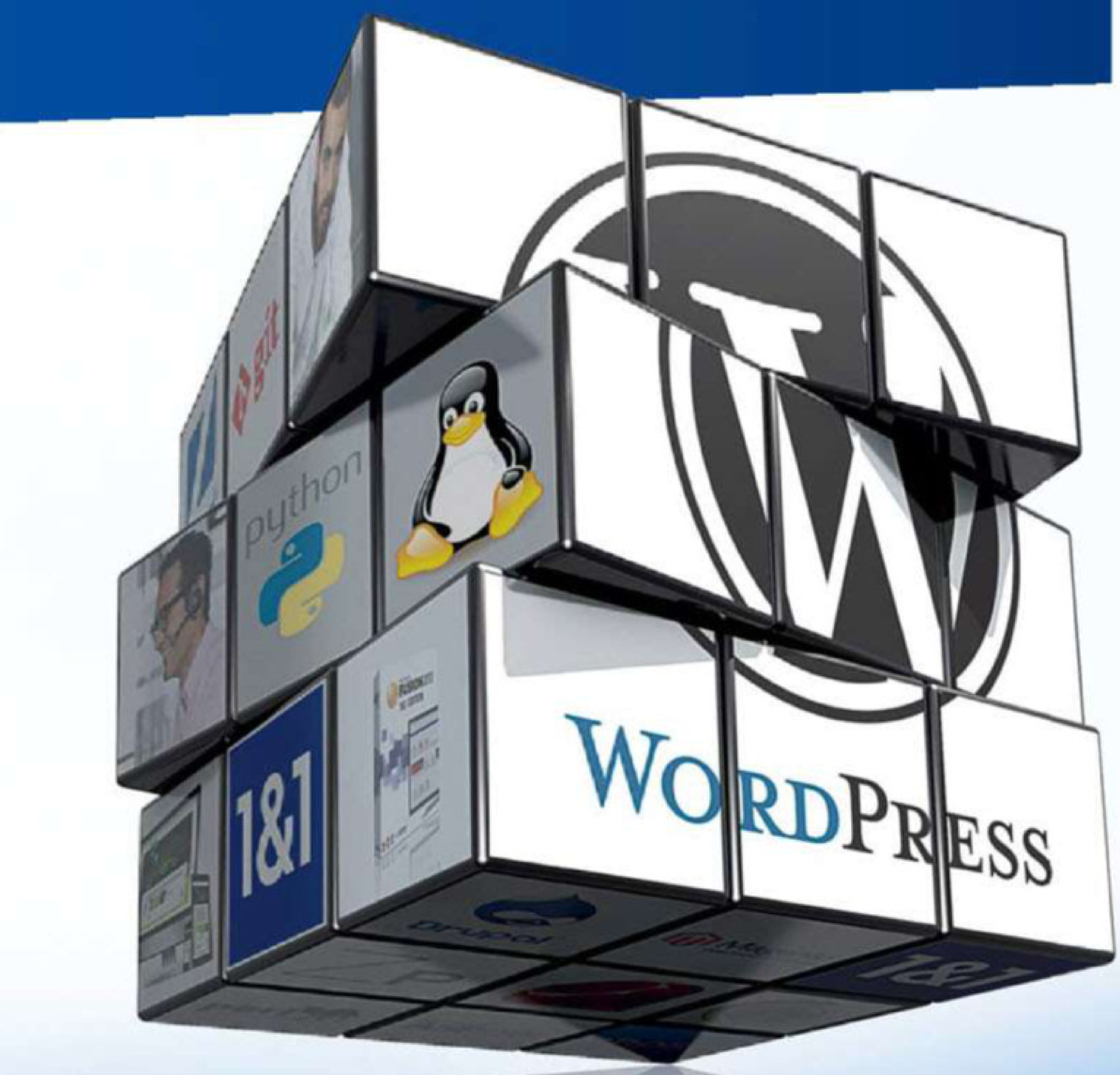

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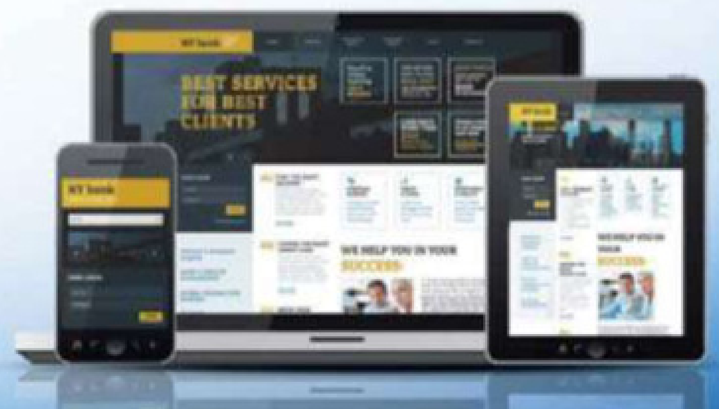

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50 3DS MAX TIPS & TRICKS

Discover what makes 3ds Max great with these insider tips from industry experts

It may seem hard to believe today, but less than 30 years ago, any workstation with software capable of creating 3D imagery cost upwards of $40,000 to $50,000 per seat. In a time when Pixar was still years away from releasing the world's first computer-animated film with *Toy Story*, Digital Domain, DreamWorks, and Maya didn't even exist. 3D CGI was not just an unknown novelty; it was completely unattainable.

Then, on Halloween 1990, Autodesk changed the course of the computer-graphics industry forever. Working with a tiny core team of five to seven developers led by Gary Yost, who had been creating under licence for Autodesk since 1988, the company released a brand new piece of software: 3D Studio. The price was an unprecedented $3,495, and the response was unprecedented.

The Yost Group would spend the next seven years working 14 hours a day, seven days a week to create what we know now as 3ds Max, and its legacy lives on. With artists around the world using 3ds Max to create incredible imagery every day, we brought together a hand-picked group of experts to reveal their personal tricks for everything from modelling to texturing, lighting and rendering – so you're guaranteed to learn something new!

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Iron Knight by Lin Zhang

50 3ds Max tips & tricks

BEFORE YOU BEGIN

01 **Use plug-ins** There are lots of great well-known plug-ins for 3ds Max, such as Forest Pack, RailClone, FumeFX, thinkingParticles, and V-Ray, but also smaller ones like Quad Chamfer, MultiTexture Map, Relink Bitmaps and the Tension modifier. They make my 3D life so much faster, easier and better. Basically, remember that somebody has already scripted a solution for all your problems! **Reinier Reynhout**

02 **Don't forget the layer feature** It will make managing 3ds Max scenes so much easier. There are plenty of plug-ins and scripts for adding features to 3ds Max's simplistic Layer Manager, but even on its own it is a powerful tool and should be used, especially on large scenes. **Coman Mihai-Alexandru**

03 **There is an active 3ds Max community out there** Register at all big forums like CGTalk, 3DTotal, Ronen Bekerman, CGArchitect and, of course, the websites for the community of your country. People share their knowledge all the time! **Reinier Reynhout**

04 **Use 3ds Max's customisability to your advantage** I have made my own shelves: most-used Modifier shortcuts in the Modifier Stack, personal shader library, presets for rendering, PFlow setups and much more. It saves me time every day. I've seen people customise their 3ds Max so much that for me it looked like completely new software. **Reinier Reynhout**

05 **Optimise your viewport experience** Don't use the Realistic option – use Shaded for your Viewport to display. Shadows and AO on screen can make navigating the Viewport a bad experience, especially for low-end graphics cards. One of the biggest improvements to Viewport experience is also turning off Transparency, but don't forget to turn it back on if you want to use Alt+X. **Coman Mihai-Alexandru**

06 **Create a Maxstart.max file** A Maxstart.max file is the same as a scene file except it will always load as the default scene when opening 3ds Max. Set up your commonly used renderer and render settings, lighting, cameras and so on, then save as Maxstart.max in your scenes folder. This saves time setting everything up again when working on a new scene. **Stefan Morrell**

07 **Build a small number of base scenes** As you perfect your craft, you will find that some render, camera and light settings work particularly well for interiors, exteriors, product shots or animation. Whenever you do, save an empty copy of that scene (with camera and lights but no geometry) and call it Exteriorbase, Interiorbase, or whatever. You can use these empty scenes as a starting point to speed you up when beginning your next project. **BBB3viz**

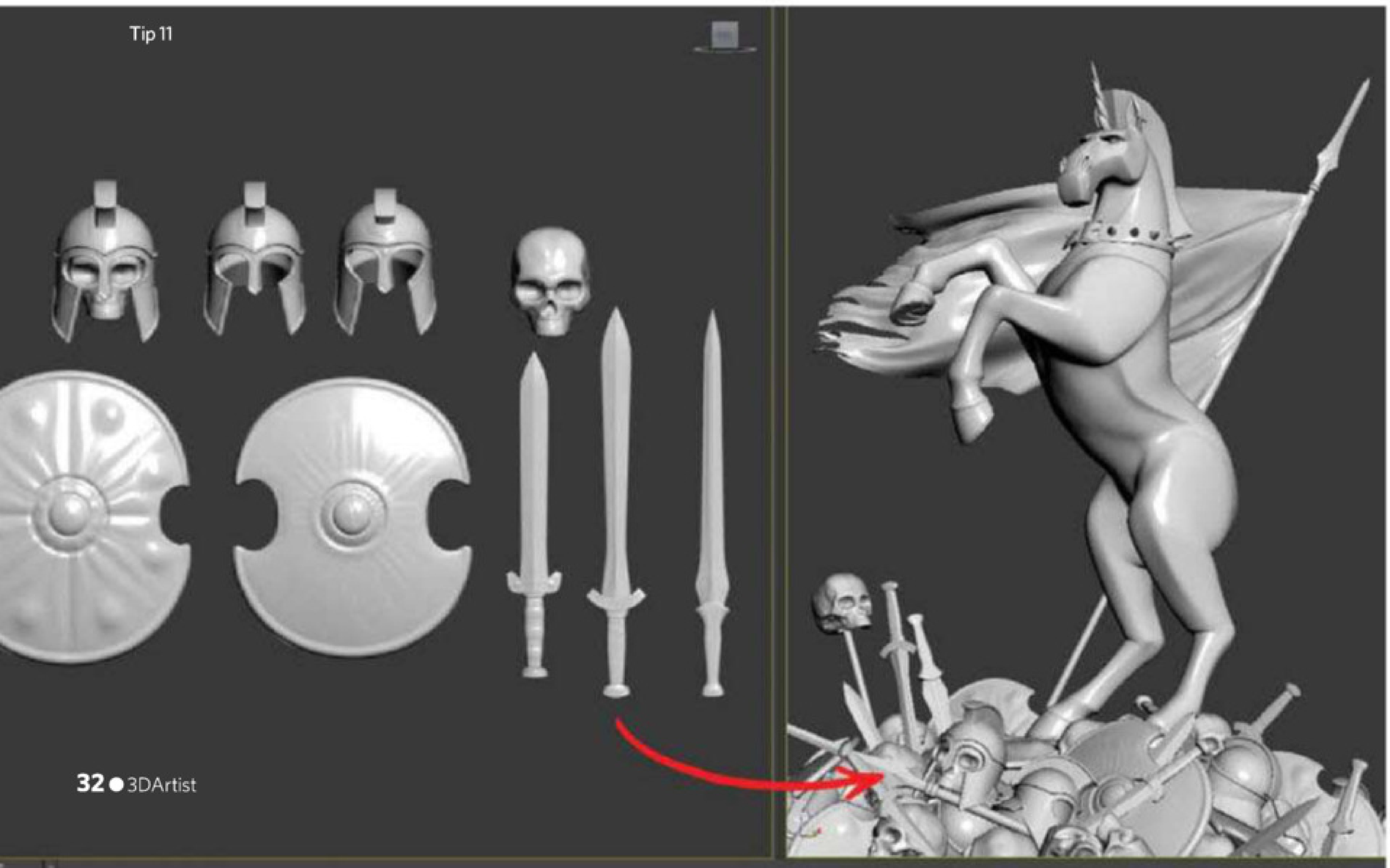
08 **Manage and organise large assets** V-Ray proxies are perfect to store large entourage assets that will be reused across many scenes – for instance, high-poly trees for architectural exteriors. One limitation is that V-Ray's mesh format doesn't store material data. To work around this, save every proxy you create with its material applied in its own 3ds Max scene and store these scenes in a separate proxy folder (you may want to keep the source mesh in the same scene file if you want to modify it later). When working on a new scene, just browse the folder and merge the proxies you need. **BBB3viz**

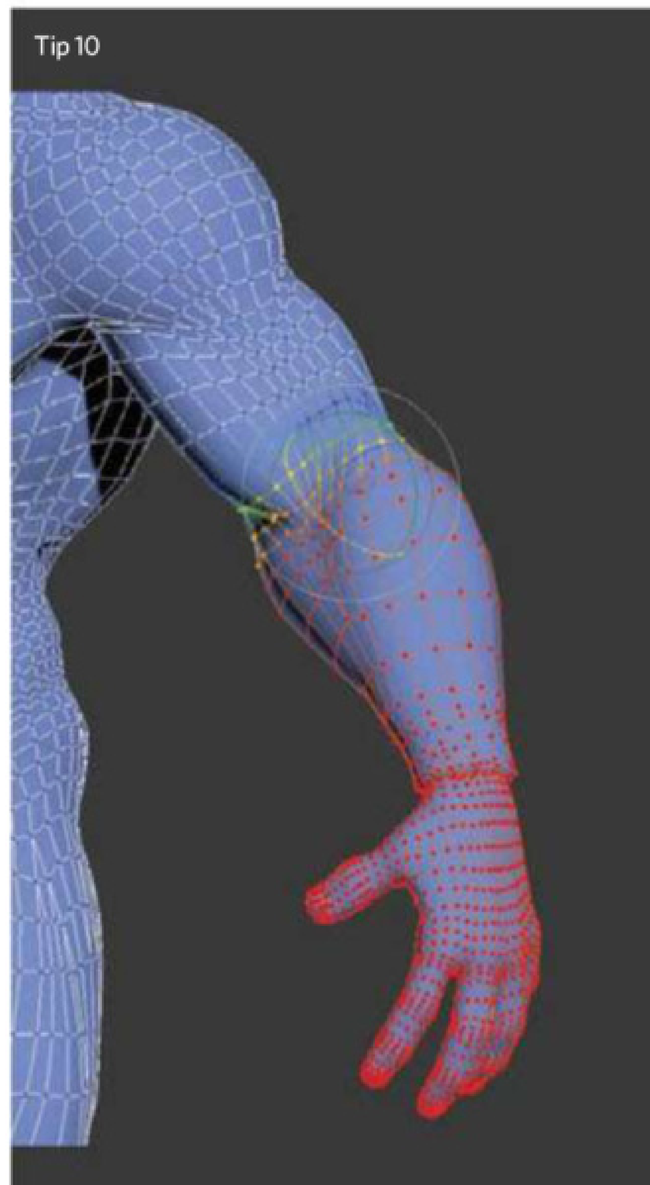
MODELLING

09 **Always use real-world scale when possible** It doesn't matter if the units are in inches or centimetres as long as your scale is real world. You can always change these by going to Customize>Units Setup. What I do is to set my character size to around 180cm and just take it from there. The easiest way to check the size of your character is to just create a box that has the desired height or by using the Tape tool, which can be found in the Helpers tab. **Hasan Bajramović**

10 **Working Pivot** Sometimes while modelling, you have to do local and precise transformations, but the centre of the volume or the original pivot point won't be where you need it to be. You can make a temporary pivot point without losing the original one. Go to the Hierarchy menu, choose Edit Working Pivot, place it and align it. Then enable Use Working Pivot. After making the transformations, disable Use Working Pivot to go back to the original pivot. **José Alves da Silva**

11 **Instances and references** When an object has got a position that is not aligned to any Viewport it can be hard to edit. However, if you make an instanced copy of that object aligned to the Viewports, you can edit it and the changes will be replicated on the non-aligned object. If you make a





reference copy you can even add Modifiers to the non-aligned object and edit the simpler Viewport-aligned base model. **José Alves da Silva**

12 **Instance and Greeble for distant cities** Whenever I work with large-scale cityscapes I try to instance as much geometry as I can and use the Greeble plug-in for instant city block generation. Instancing uses far fewer resources than simply cloning/copying each mesh. If you want to download a simple, yet handy version of this plug-in, head online to www.max.klanky.com/plugins.htm. **Stefan Morrell**

13 **Realistic Random effect with Noise Modify** A smart tip is to use the Noise Modify tool to give some randomness to your elements. As you can see in the image below, this canopy was simply modelled with a spline and then I turned on the visibility on the Viewport. Afterwards we just needed to select the vertices and apply Noise to them. The final result is a really soft variance between all the ropes, which makes it look credible and realistic. **Diego Querol**

14 **Edit Poly geometry** To avoid problems in the renders, such as wrong shadows or different tones, all the geometry needs to be converted to Edit Poly. Editable Poly is optimised for advanced modelling, creates fewer errors than editable mesh and has many more settings. **Sérgio Merêces**

16 **Distribute objects with ease along a spline using the Spacing tool (Shift+I)** This is a lifesaver for me when I'm detailing my models. Just create a spline manually or by using the Create Shape From Selection button in Editable Poly. Select the object that you want to distribute and open the Spacing tool. Hit Pick Path and now all you have to do is adjust the object count and play with some of the other settings, depending on your needs. **Hasan Bajramović**

17 **Start from kitbash** Making a good kitbash collection of various elements – either mechanical parts or natural models, such as different rocks, grasses, trees and so on for organic environments – is a good way to start building sets because a lot of objects in 3D environments get repeated and reused. After building a few base objects in your environment, these kitbash collections can be used to add complexity to the scene. **Toni Bratincevic**

18 **Use World Machine for natural environments** World Machine is one of the best choices for generating natural-looking mountains; I've used it in my workflow for years. It has options such as the ability to export Erosion maps, which can then be used as masks to build complex materials in 3D software. Sometimes I tend to bring generated meshes from World Machine into ZBrush and sculpt on them even more to add additional details that fit better with my scene. World Machine gives you the option to export mountains either as a mesh or map that can be used as Displacement. **Toni Bratincevic**

19 **ProBooleans** Booleans are known to be problematic, however the ProBoolean has reliable results and is highly flexible. Under Compound Objects in the Geometry menu choose ProBoolean. Then you can pick several operands and define the Boolean operation for each of them (union, subtraction, intersection and so on). The great part is that the process is non-destructive, so you can always go back to any operand in the list and move, edit or animate it, getting the result in real time. This is a great solution for very complex, non-organic models. **José Alves da Silva**

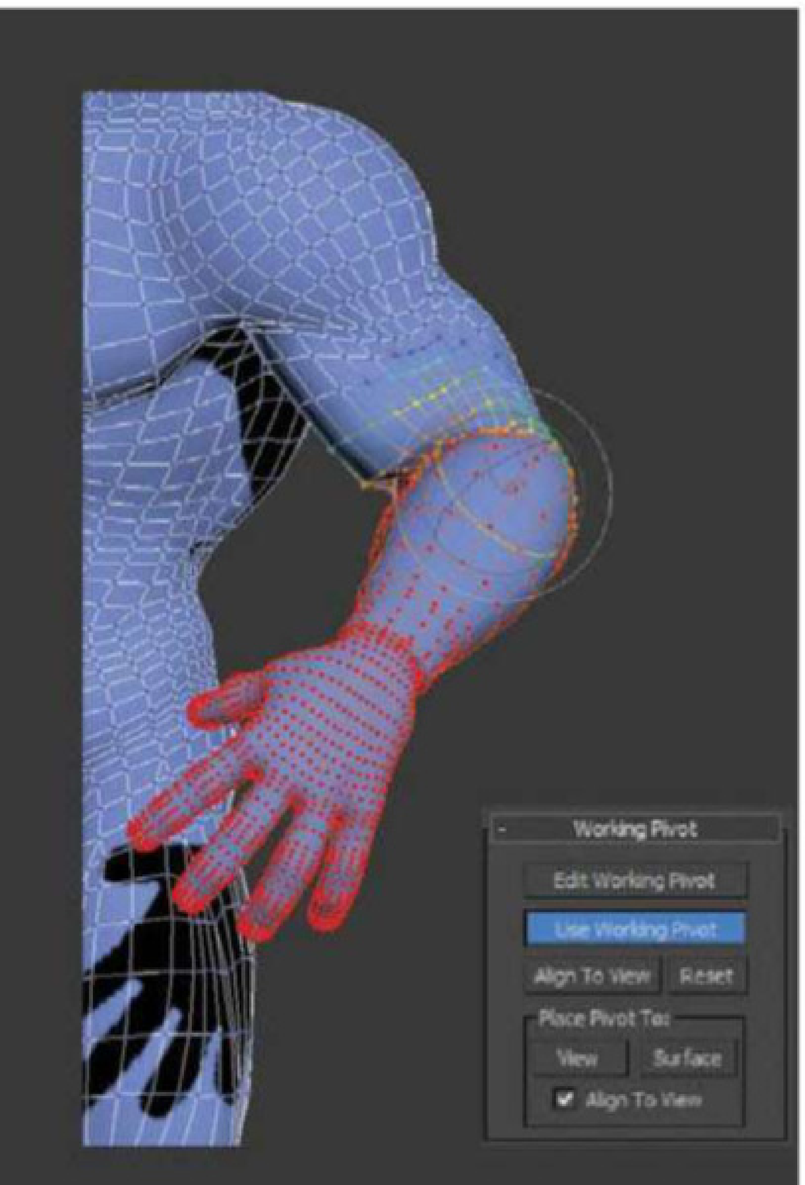
15 **Press 7 to display Viewport statistics** To get an idea of the scene polygon and vertice count, press 7 on your keyboard. To select which details are being displayed, you can right-click the plus symbol at the top-left of your Viewport>Configure Viewports>Statistics. Here you can choose poly or tri count, frames per second and so on. **Stefan Morrell**

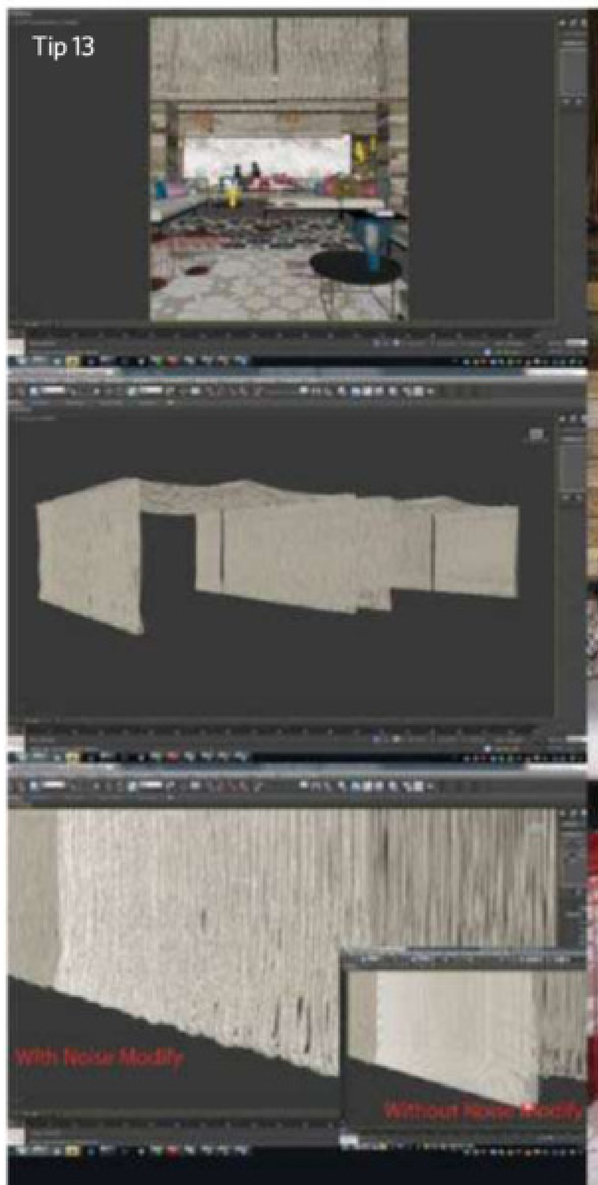
Optimise your geometry By using the correct tools and retopologising your sculpts, you can save yourself or your colleagues plenty of headaches later on down the pipeline.

20 Use as few Booleans as possible. If you do use them, repair your mesh.

21 When preparing for sculpting, try to equalise the size of your polygons to ensure you have a better experience in your chosen 3D sculpting program.

22 To avoid bad or slow UVW mapping, make the model as perfect as possible in any way, with no – or very few – tris or N-gons, and edit your seams as many times as necessary to obtain the cleanest UV layout you can. If you do this, you will thank yourself later. **Coman Mihai-Alexandru**





50 3ds Max tips & tricks

SHADING & TEXTURING

23 **Align UVs** When you are creating a model that needs to have patterns applied, especially in clothes, your UV borders need to be perfectly aligned. In the Unwrap UVW modifier, start by using the Relax Tool to unfold the UVs. Choose the border edges and under Quick Transform pick Align Horizontally/Vertically to make them straight. To make several edge loops aligned and parallel, keep pushing the Align Button and another Align option will appear (Align Horizontally/Vertically in Place). This will align each edge loop individually. Then use the Relax tool again with the Keep Boundaries Points Fixed option enabled. You'll get straight edges and well-proportioned interior faces. **José Alves da Silva**

24 **Tweak the UVs** When you have UV distortions it doesn't feel very instinctive to fix them inside the Unwrap UVW modifier. However, in the Graphite tools under Modeling you will find a Tweak button. When the Tweak setting is active you can move the UV's position locally by painting on the mesh, pushing the texture to the exact place with real-time feedback on the Viewport. **José Alves da Silva**

25 **Use handy Maxscripts** I would recommend an awesome pack called Soulburnscripts written by Neil Blevins (**www.neilblevins.com**). Among others, I mainly use VRay Material Control by Oliver Radford, Advanced Painter by Herman Saksono, and Relink Bitmaps by Colin Senner. For more specific scripts, check out the website www.scriptspot.com. **Marek Denko**

26 **Perfect reflections require a good environment** If you are looking for a very good glass shader, the answer is pretty simple no matter which rendering engine you are using. The key to such effect is the environment. Glass in 3ds Max will look good only if there are elements that can be reflected. It is a very good practice to reflect objects that cannot be viewed in the actual frame. This way, we are practically extending our scene and make the viewer think there is much more to see. **Pawel Podwojewski**

27 **Buy a DSLR and look at the real world** It opened up a whole new skill set: you can look at light, textures and materials realistically. Also, once you understand your camera you'll understand your 3D camera better. I never learned more than by buying my DSLR. You can even build up your own texture library and HDRIs in the process. **Reinier Reynhout**

28 **Texturing large areas** For 3D visualisation and to texture large areas, such as terrain and buildings, I often use the Bake To Texture option to add as much detail as I can. This method guarantees the best and most realistic results from the materials. **Sérgio Merêces**

29 **Use Procedural maps to hide the tiling effect on textures** In arch-vis, you will often need to cover large areas with the same texture (think gravel, plaster or concrete), but even good, seamless textures will show tiling when repeated. To counter that, make a copy of your bitmap in the Material Editor, offset it in both axes by a random value, and plug these two bitmaps in a Composite or Mix map. Then take a Noise map with fractals on and use the RGB curve to clamp it to just black and white (it will look like a cow hide). Now you can use this Noise map as a mask to mix your two bitmaps, introducing chaos in the tiling – though you'll need a high value for the scale of the Noise. This will only work for relatively uniform textures, not for those with repetitive patterns, such as bricks, planks or tiles. **BBB3viz**

DYNAMICS & PROGRAMMING

30 **See your trajectories** To better see a fast-moving particle's trajectory, spawn new particles with 0% Inherited Speed and Divergence. **Valdemaras Dzengo**

31 **Avoid using high-poly objects within simulations** Make low-polygons copies wherever possible, then link or skinwrap them to the originals. Sometimes it's necessary to bake entire particle animations with simple boxes, then replace those with the desired high-poly animated objects. **Valdemaras Dzengo**

32 **Export the Temperature channel** When working with fluids in 3ds Max, as you may find yourself doing with FumeFX, export the Temperature channel. By doing this, you can see how much actual heat you have in the grid. You can also render Temperature with the Channel Data shader. **Valdemaras Dzengo**

33 **Vary your sources** To better understand and control FumeFX burning features, try to have different sources for the Fuel, Temperature and Smoke channels. You can even create a particle source just for pushing Velocity to allow you to sculpt fire or an explosion in a desired way. **Valdemaras Dzengo**

34 **Split an effect into simple parts** When developing a new effect, do not try to think about its overall look. Split it into simpler parts, such as movement, big shapes and small details. Step by step, try to accomplish the desired result in every part. **Valdemaras Dzengo**

35 **Variations** Observe the world, and you'll find that there is no such thing as totally random variation. Something will always come first for the eyes, and then something else will always come second. This can be applied to every aspect of 3D art, from modelling and texturing to animation forces. **Valdemaras Dzengo**

36 **Use MassFX** The MassFX toolset is a powerful tool that you can use to give more realism to your scene with certain effects. For example, you can use it to quickly get a realistic cloth deformation in a object or to spread books and papers on a desk randomly. **Sérgio Merêces**

37 **Hair and Fur** There is a really powerful and useful modifier that you can use in 3ds Max, which let us create very realistic fur for our scenes. By using the Styling tool, you can modify the hairs exactly as you'd like them. This means you can define the hairs to suit your scene, whether that means thin or really thick hairs. **Diego Querol**

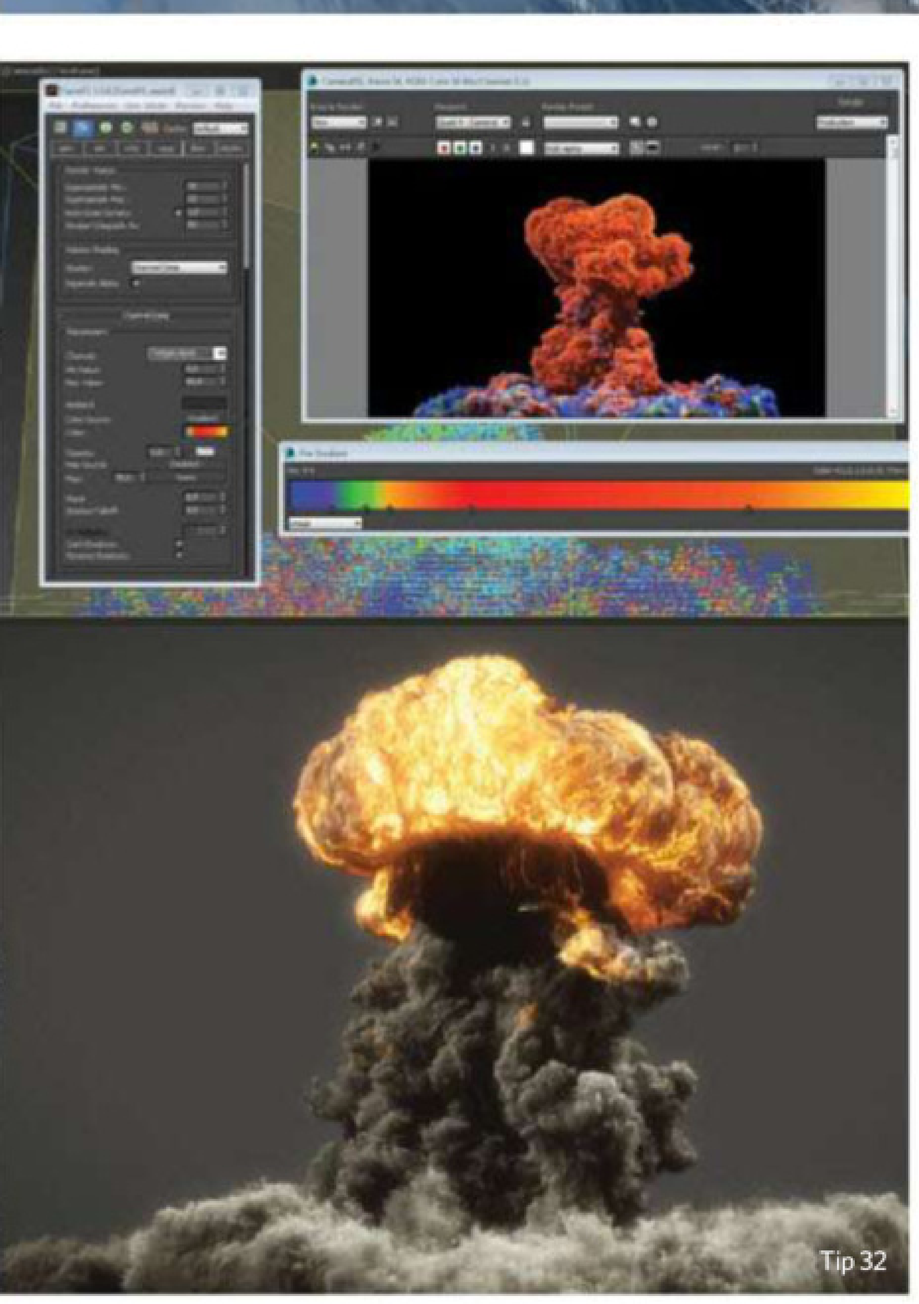
PFlow tips

38 Use the ; key to quickly turn off or turn on PFlow particles.

39 To merge a PFlow system from another scene, use Merge PF Engine Object. In the Merge dialog box, ensure that you check Select Influences.

40 You can also merge a PFlow setup by saving it as a preset in Particle View (Tools>Preset Manager). Just keep in mind that all of the objects in the scene will also be saved, so you should always delete any unnecessary objects before saving. **Valdemaras Dzengo**

Tip 26

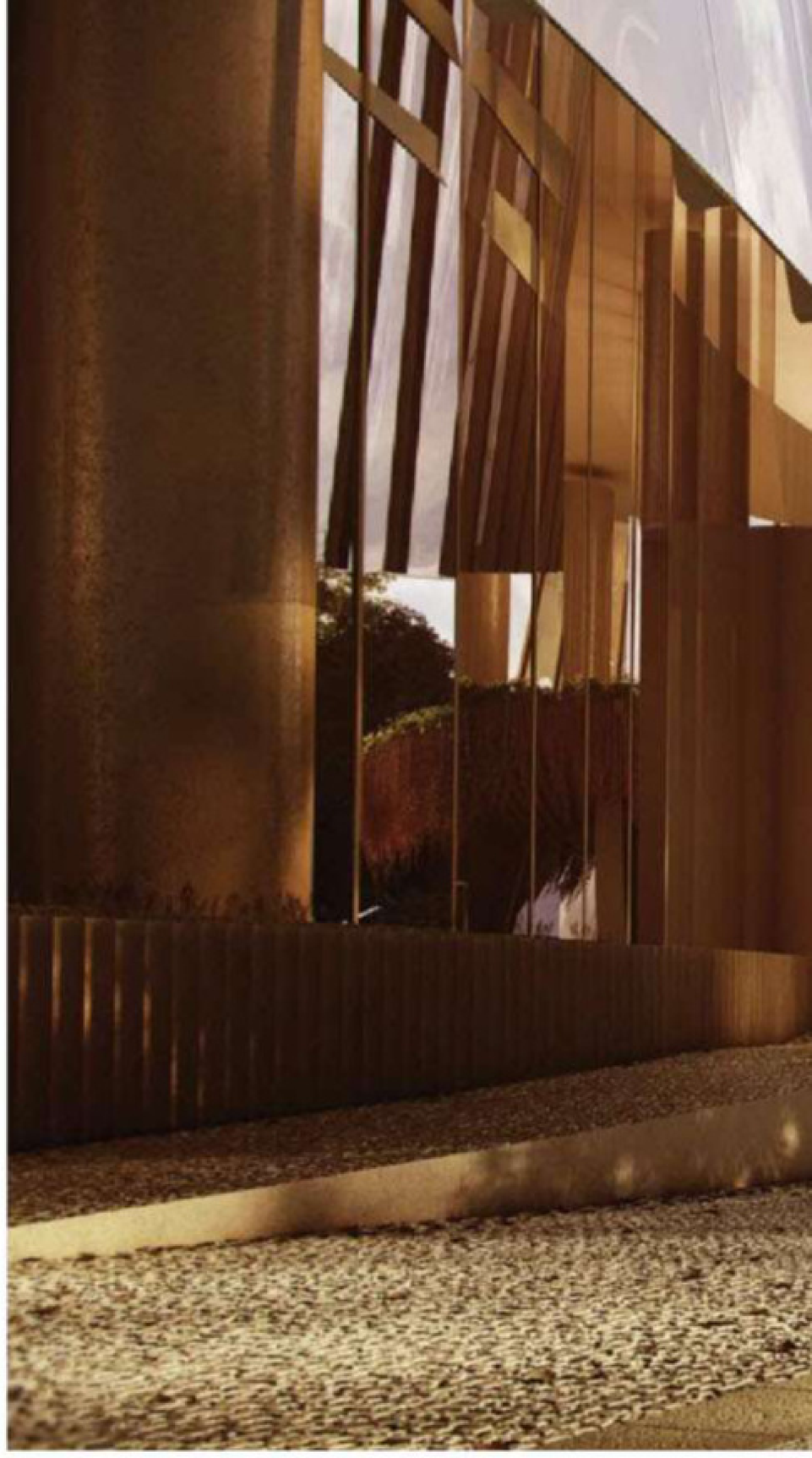


The Block by Stefan Morrell

50 3ds Max tips & tricks

Tip 41

Battlefield by Dragos Jieanu



LIGHTING & RENDERING

41 **The rule of thirds** When I finish a scene, I always try to use it to adjust the position of the camera and observe some rules of photography. One rule, the rule of thirds, is very simple. It proposes that the image should be divided into nine equal parts, and that important compositional elements should be placed along the intersections to create more interest in the piece than a central object would. I use the Image Composition Helper script (**www.cbuelter.de/?p=176**) to help. **Cauê Rodrigues**

42 **Use the Gradient map to animate cloud shadows** With the use of a Spot light we can map the projector with a noisy gradient. This works particularly well for cloud shadows if the noise is large enough, but you can also simulate some nice forest lighting if you make the noise a little bit smaller. Simply animate the Gradient's phase if you want moving cloud shadows. **Dragos Jieanu**

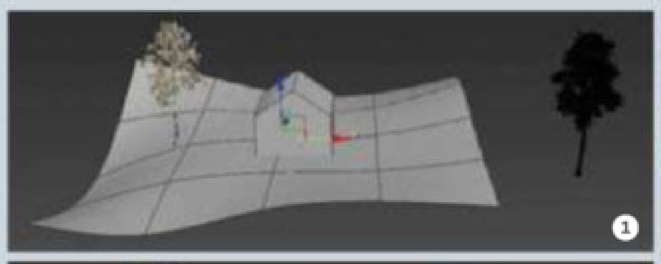
The Forest Pack plug-in

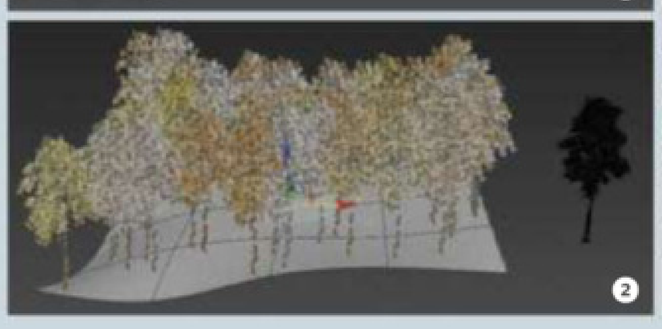
Forest Pack **(www.itoosoft.com/forestpack.php)** is a very useful plug-in for 3ds Max, which is designed for the creation of vast surfaces of trees and plants. Forest Pack enables you to scatter millions of proxies, high-poly meshes or billboards, and using custom geometry shaders, or create scenes with a virtually unlimited number of objects and polygons.

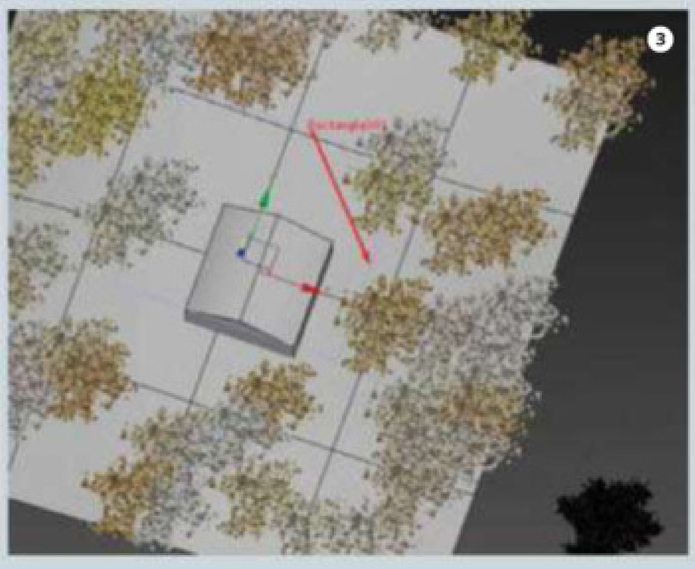
❶ Create a Forest Pack object and click on the surface, then select the tree in the Custom Object section.

❷ To change the amount of trees in the scene, experiment with the Units value in the Distribution Map tab.

❸ Add some variation in scale and rotation through the Transform, Rotation, and Scale options. **Cauê Rodrigues**







ABIAN TOWER by Pawel Podwojewski

43 **Always use a linear workflow when rendering** You will get better lighting and light falloff in your renders with a linear workflow. Personally, I prefer leaving Enable Gamma/LUT Correction unchecked and just setting Vray Color mapping to Gamma Correction and 2.2 Gamma. Don't forget to change Gamma on your input images to 0.454. **Hasan Bajramović**

44 **Create test renders** When doing test renders, lower your Shadow, Reflection Glossiness and Global Illumination quality to get those renders done faster. When using VrayDisplacementMod, try to keep the subdivision values at a reasonable level. Try doing some test renders with lower values first. **Hasan Bajramović**

45 **Try to use low-resolution models as a base to test your lighting** High-res models will slow down your rendering time, so don't set too much light in your scene. Use just one light, then carefully add more lights one by one, depending on what you see in test renders to avoid messing up your lighting effect. **Lin Zhang**

47 **Organise your projects in most efficient way** It is essential to organise your project files. 3ds Max has got a built-in tool that allows you to manage the project's content. Reset your scene and manage the new location of your project. This way all paths including the export of meshes, previews or textures will be in the correct place in a newly created set of properly named folders. Make sure to work with UNC file system (go to Preferences>Files and check Convert File Paths To UNC). **Pawel Podwojewski**

48 **Keep all your assets ready to use** Keeping your assets in the correct place and connecting them properly is essential for every project. I know from my own mistakes that as a beginner or even later on as a freelance artist, I could work in chaos without paying much attention to asset locations. For farm rendering and group work it is absolutely crucial to keep order in your files so you can locate them in the right way. To do so in 3ds Max, you should use Asset Tracking. This way you can locate all missing files like textures, meshes, proxies and so on. **Pawel Podwojewski**

46 **Deal with huge scenes** To render huge scenes, such as cities, I divide my scene into different areas that I save individually in a different 3ds Max file, then render them all together at the end. I use the Xref object to bring them together so I can work in each area without losing any performance when dealing with scenes with lots of geometry. **Sérgio Merêces**

49 **Render Z-Depth** When rendering for illustrations, make the most of render elements. Z-Depth is great for creating atmosphere in Photoshop. I'll use 3ds Max and generate Z-Depth with Photoshop's Color Picker to select areas behind the buildings. This allows me to paint clouds and fog to add atmosphere. It's possible to use 3ds Max's Volume Fog to achieve similar atmospheres. **Stefan Morrell**

50 **Colour correction** Images coming out of a render can look really good, but keep in mind that post-processing a rendered image can produce an even more visually striking result when done correctly. Adding small visual details, such as localised colour corrections, a layer of noise on the image, depth of field, a glow or a slight sharpening can make your render look more realistic because it can introduce small imperfections to the image, making it look more like photo. Software like Fusion or NUKE is perfect for these tasks because they are built around non-destructive workflows. Photoshop can also be a good place to do post-processing too, but sometimes it requires you to bake certain effects. **Toni Bratincevic**

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Yasin Hasanian

Personal portfolio site www.superhero.cgsociety.org

Country Iran

Software used Maya, ZBrush, MARI, Arnold, Photoshop, NUKE

Expertise Yasin specialises in texturing, shading, lighting and hair simulation

Re-create nature

Eye of Horizon 2014

"Learn to use XGen in Maya to simulate feathers on a bird"

Yasin Hasanian is a freelance CG artist working in the film and game industry. He holds a bachelor's degree in Computer Science and is getting his Master's in Computer Engineering

There are many eagle species, but one of the best known of these is the golden eagle. In this tutorial we will go through the process of creating sets of feathers in ZBrush, transferring them to XGen to cover our eagle, texturing them and rendering with Arnold.

XGen is a powerful toolset for procedurally instancing geometries, which first appeared in the Maya 2014 extension. It has a great deal of potential and is constantly under active development, getting better with each release. One of the key features of XGen is SeExpr, which is an expression language that provides artists with an endless amount of possibilities to achieve interesting results while maintaining a certain look. Another great feature about it is its art-directing tools that enable the user to reach the desired result much faster.

Fortunately, Arnold is nicely integrated with it as well, providing instant feedback. Over the course of this tutorial you'll find yourself becoming more comfortable with XGen. It may look a little complicated at first, but after doing a few projects you'll start to benefit from it.

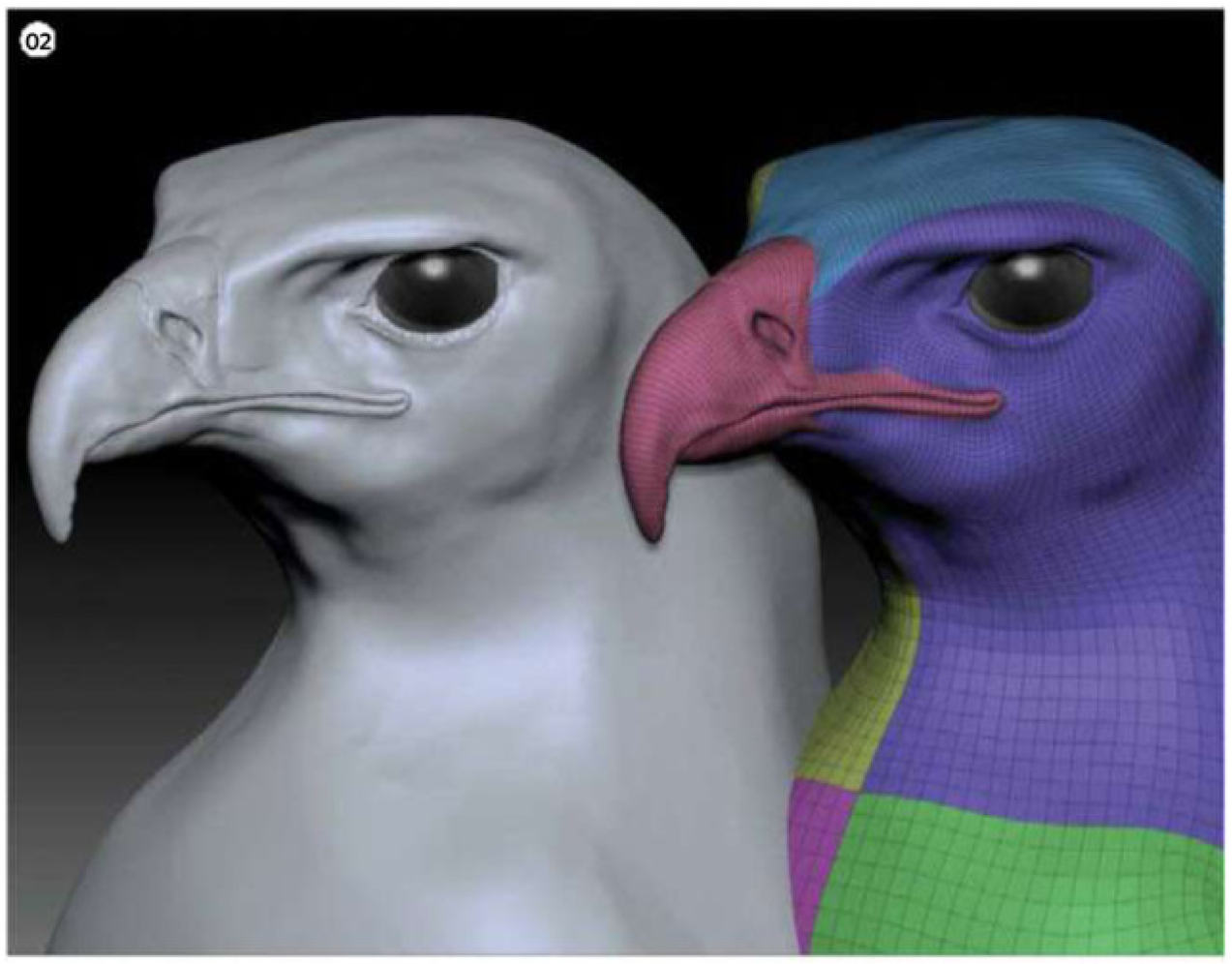
01 Gather references As usual, it's best to start off a project by gathering photo references, especially when we know the project is going to need extra attention and planning ahead of the production. After gathering references, the next step is to analyse them so that you can identify various types of feathers and how those are spread out over the eagle's body. This identification step is the most important first step of the process. In this work, about ten different feathers have been identified. There are also a couple of websites categorising feather types in detail, which you can study from.

02 Model the body The ZTool of the eagle model is provided with this tutorial for you to start from – however, there are a few things you need to bear in mind. For the best results using XGen, make sure your model has a nice topology with as uniform a density of polygons as possible. Second, XGen relies on Ptex maps. Maya provides the ability to paint such maps, but I'd suggest keeping the model UVs in one tile if possible – mainly because Artisan doesn't yet support painting on multiple tiles, although you can always set up a different UV set and paint on that with no problem.

Get help from anatomy

Often relying solely on reference images will not help much when it comes to re-creating real-life characters, particularly animals. This is where you need to study anatomy, considering how body structures are related to each other. The eagle's eye shape is different from a human's, which is a rather curved eyeball. Both eagles and humans have a white area called the sclera, but in the case of eagles, it is hidden below the eyelid. Eyelid openings are oval-shaped in humans, while they are round in the case of birds' eyes.

01 © J. Glover – Atlanta, Georgia



02

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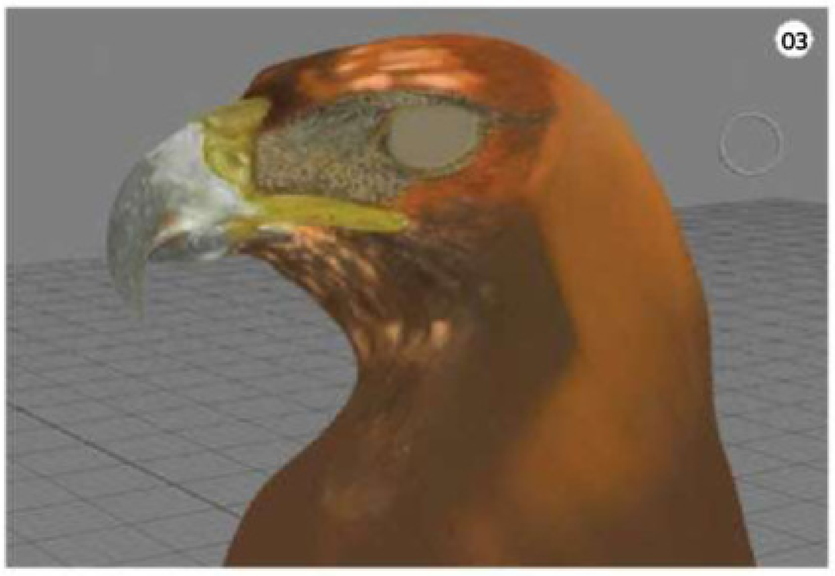
Concept

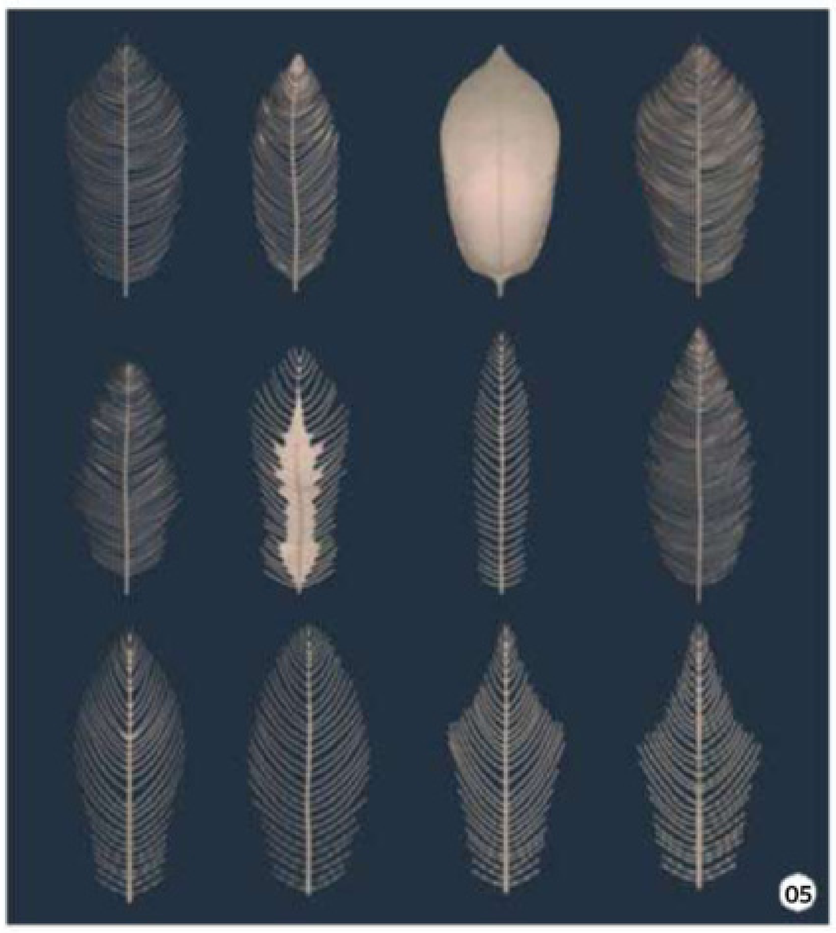
Often I find myself intrigued by the wonders of nature and the animals around us. I am fascinated by the eagle: a symbol of power and freedom. They have incredible eyesight, which is capable of seeing five basic colours, when humans can only see three.

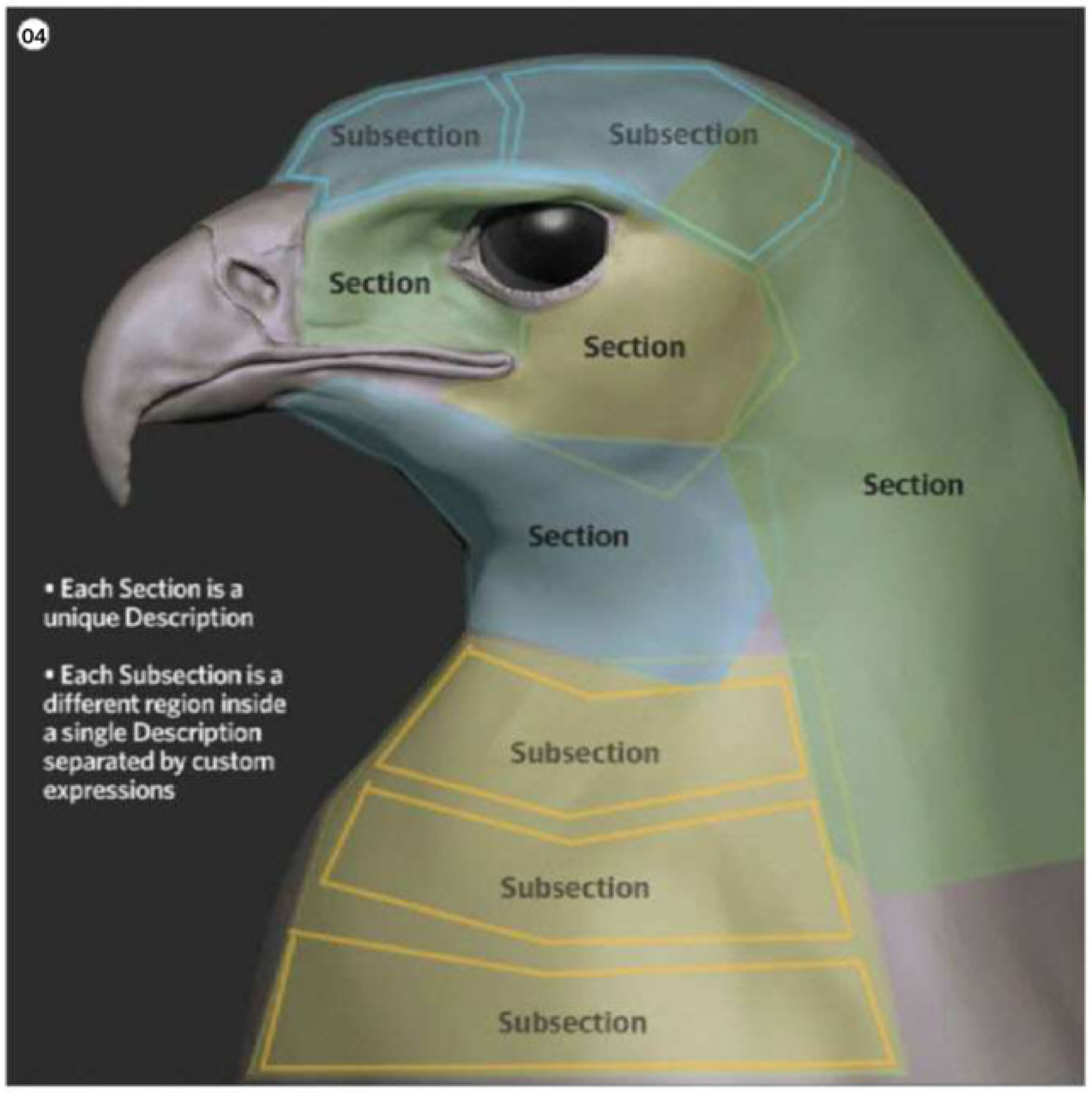
Learn how to

- Exploit XGen in a production environment
- Populate and groom feathers on a character
- Texture feathers in various ways
- Use Arnold rendering features
- Use ZBrush to create feathers as Archives
- Troubleshoot various problem cases



03 Add colour to the body In order to texture the body, I sent two LODs to MARI and started painting the textures. One thing to be aware of is that if you're going to be using this texture later for the feathers' general colour distribution, try to offset your colours according to the length of the feathers. For example, if you assume that the chest feathers will be quite lengthy, drag the colours on the chest to be the length of those feathers. Doing this ensures that the colour of the feathers will spread from the roots to tips, as placing the colours at the roots defines the whole feather's colour.





04 First look at XGen XGen basically consists of Descriptions and Collections (formerly known as Palettes). Think of the Collection as a series of Descriptions for a certain object – in this case, the eagle. So there would be an eagle Collection containing all the XGen Descriptions inside it. Depending on the complexity of the work, I prefer to separate Descriptions that stand out the most from each other. While it is possible to unify all these Descriptions, that might get confusing later. There are several types of Primitives that can be created by the Descriptions. We will be mostly using custom Archives and groomable splines.

05 Model the feathers The feathers can be easily modelled in ZBrush. Initially, a cylindrical shape representing the middle shaft should be made. Once you've done this, switch to the CurveMultiTube brush and open up its Curve Modifiers tab from the Stroke menu. From there, lower the Curve Snap Distance substantially to a value of around 3. The feathers' vanes are created using this brush. Since the distance between each vane is either too short or in some cases, none at all, a high Curve Snap Distance would end up connecting each curve together, which is obviously not wanted. After creating all the vanes using this brush, randomise them using the Topological Masking.

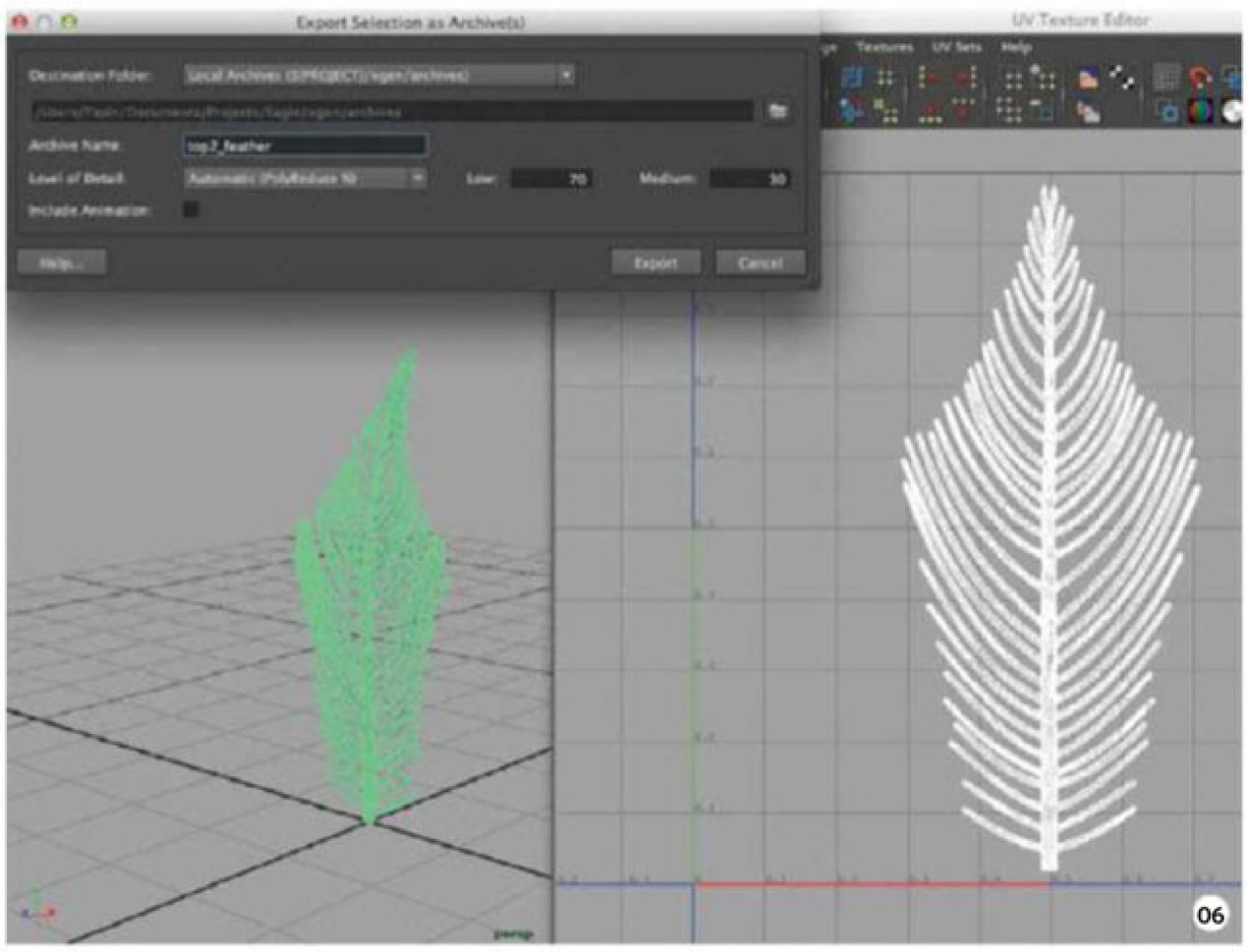
Artist showcase

Yasin Hasanian

Born in Iran in 1990, Yasin has a passion for the art and science behind CG. He holds a Bachelor's degree in Computer Science, is currently finishing his Master's degree in Computer Engineering and has been working as a freelance CG artist in the industry. Yasin has created work for many major clients around the globe, but he hopes to land a job at a major studio.

Cold as Lava **Maya, Arnold, Shave and a Haircut, ZBrush, MARI, Photoshop (2013)**
Tigers are one of my favourite animals; I'm captivated by their grandeur. This was an opportunity to depict them.

Twisted Sensation **Maya, ZBrush, Arnold, Shave and a Haircut, mental ray, Photoshop, NUKE (2013)**
This work was challenging, but it was really enjoyable. It was inspired from the works of the hairstylist Linh Nguyen.

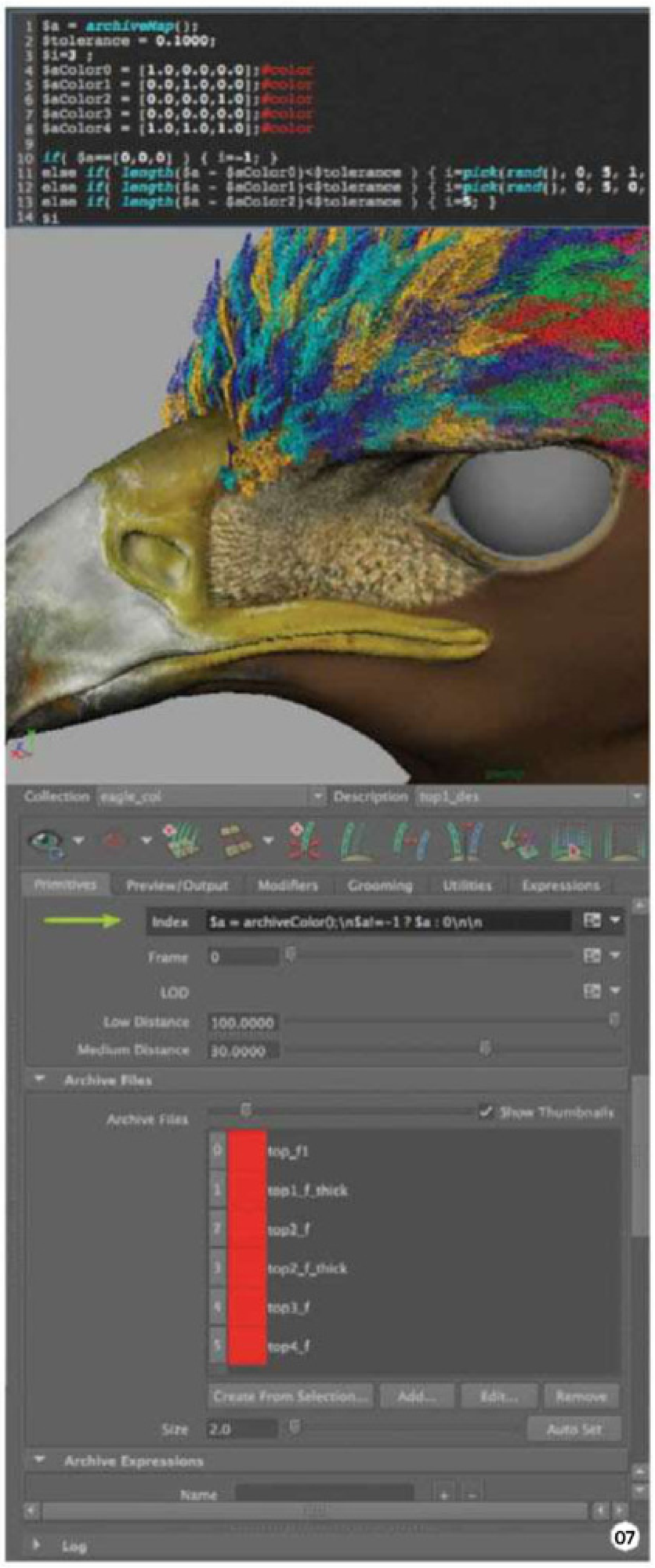


06

06 Export Archives In order to use the feather models in XGen, they must be brought into Maya and UVed there. Afterwards, each of them can be exported as XGen Archives individually. Note that if a Description contains only one Archive type, there is no need to assign it a material prior to exporting. You can assign the material later to the Description itself – however, if multiple Archives are going to be used inside one single Description, make sure you have assigned a suitable material to them, even if it's just a basic one. This way you can alter them individually when added.

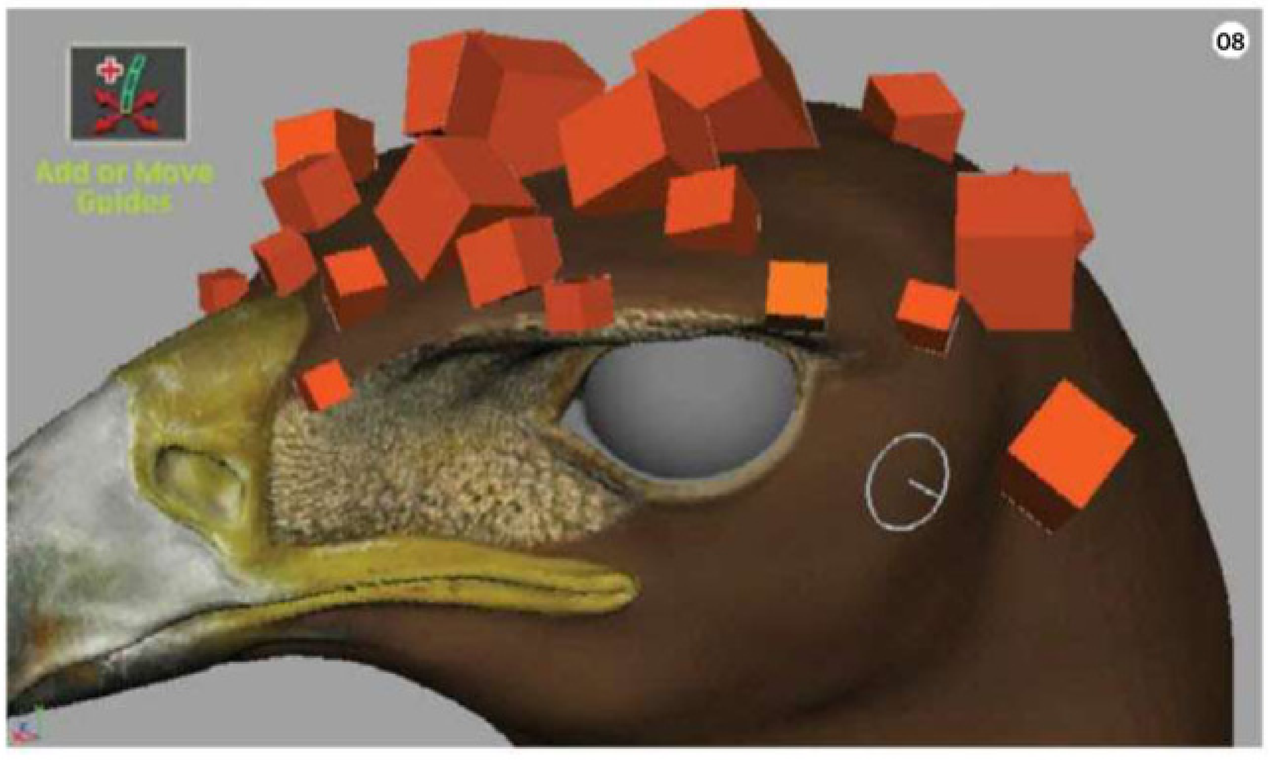
07 Create Descriptions To use the exported feather Archives, we have to create Descriptions. For each section, a Description needs to created. By doing this, the desired Archives can be added to the list. Descriptions that include certain types of Archives should be placed on the mesh in a specific manner and should be assigned a few simple custom expressions to control their distribution. To do so, switch to the Expressions tab, create a Color expression and call it archiveMap. Similarly, create a floating one and name it archiveColor. Look at the image for the code. The Index field should also be altered.

08 Control the feathers with Guides One of the ways of grooming the feathers is with Guides. Click on the Add/Move Guides icon and place Guides on the mesh. Archives can't be deformed since they are instances, but they can be scaled, moved or rotated. This can be done by manipulating the Guides. Try not to clutter the mesh with Guides – put a few Guides mainly on the borders and middle of the Description. If you manipulate these to achieve your desired look, other Guides' shapes will be inserted among the other Guides. Meanwhile, to move the Guides, Cmd/Ctrl+click and drag them around.



07

Miss Mutation **Maya, ZBrush, mental ray, Photoshop (2011)**
Maya was used for the base mesh and scene setup, ZBrush for sculpting, Photoshop for texturing and final touches, mental ray for rendering and it was composited in NUKE.



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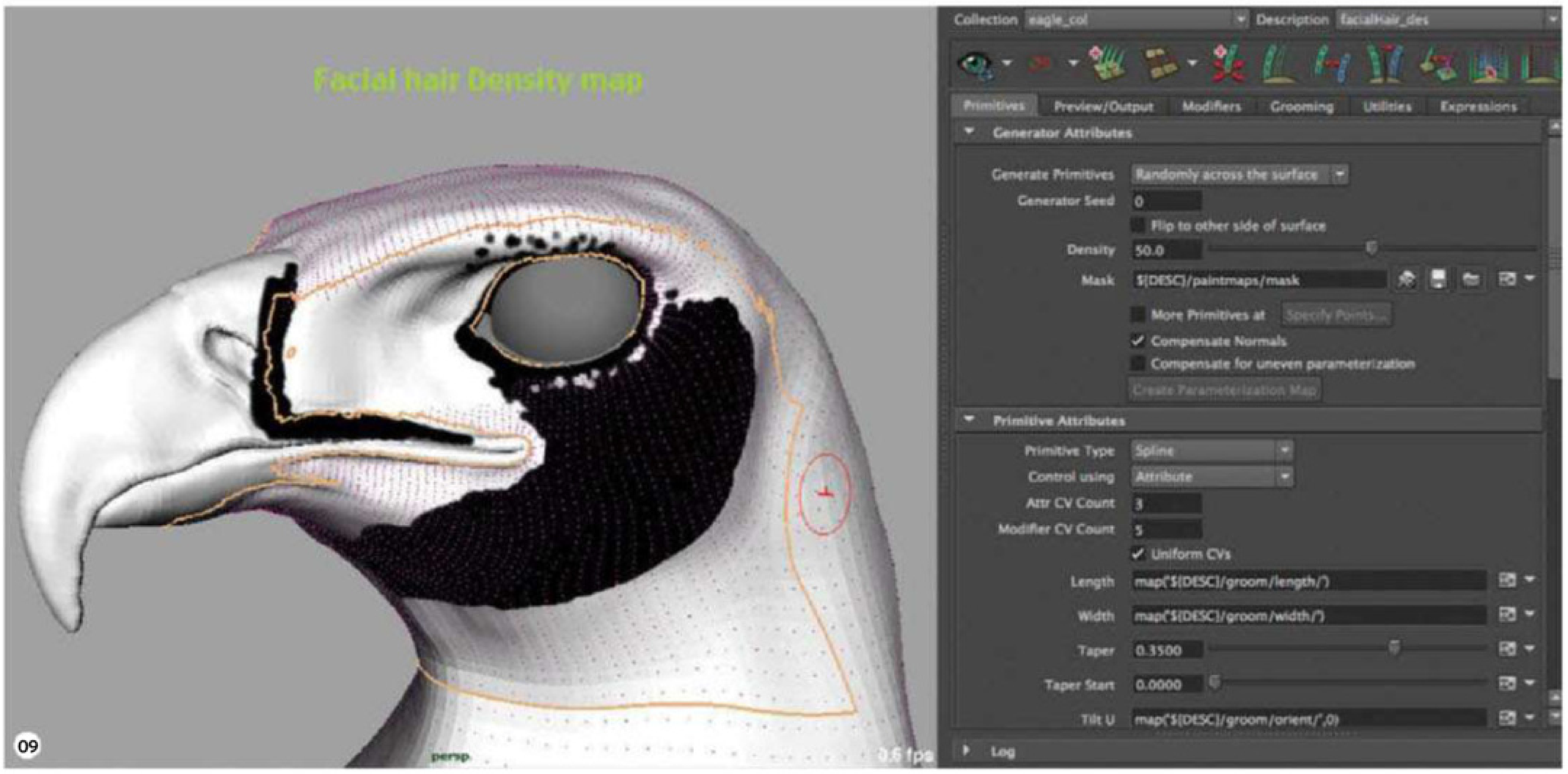
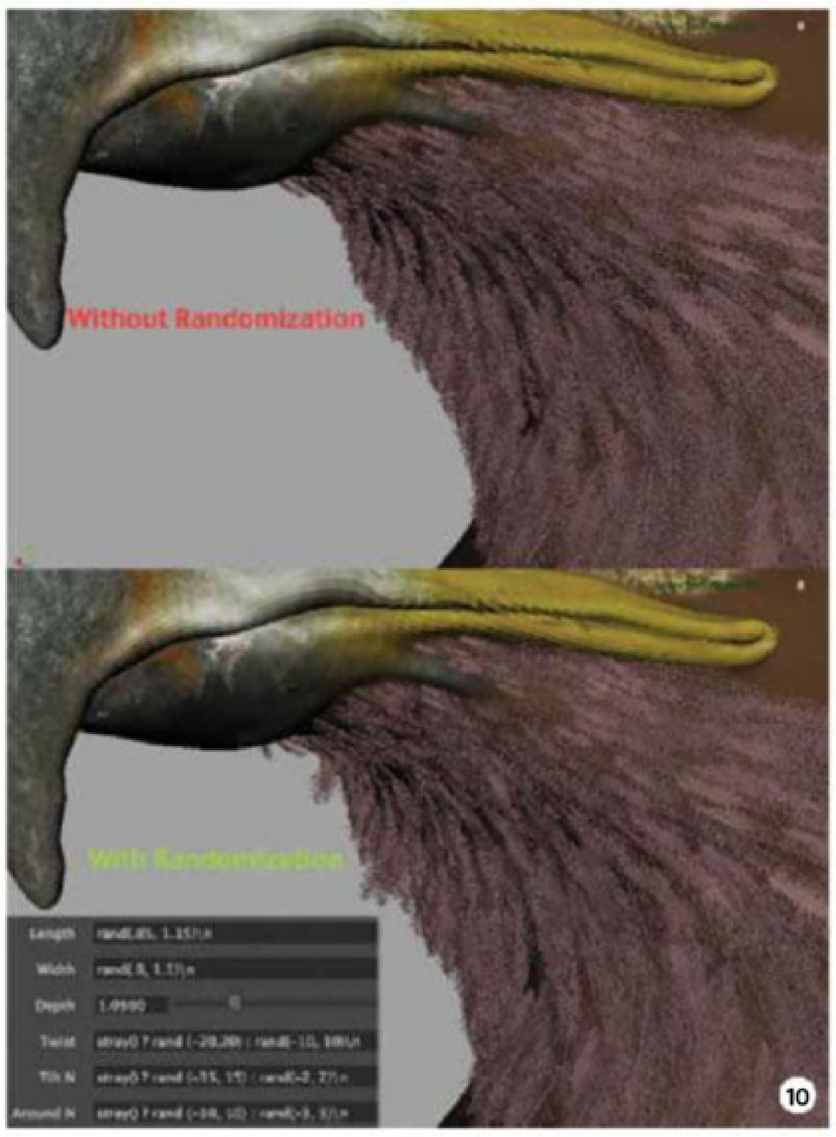
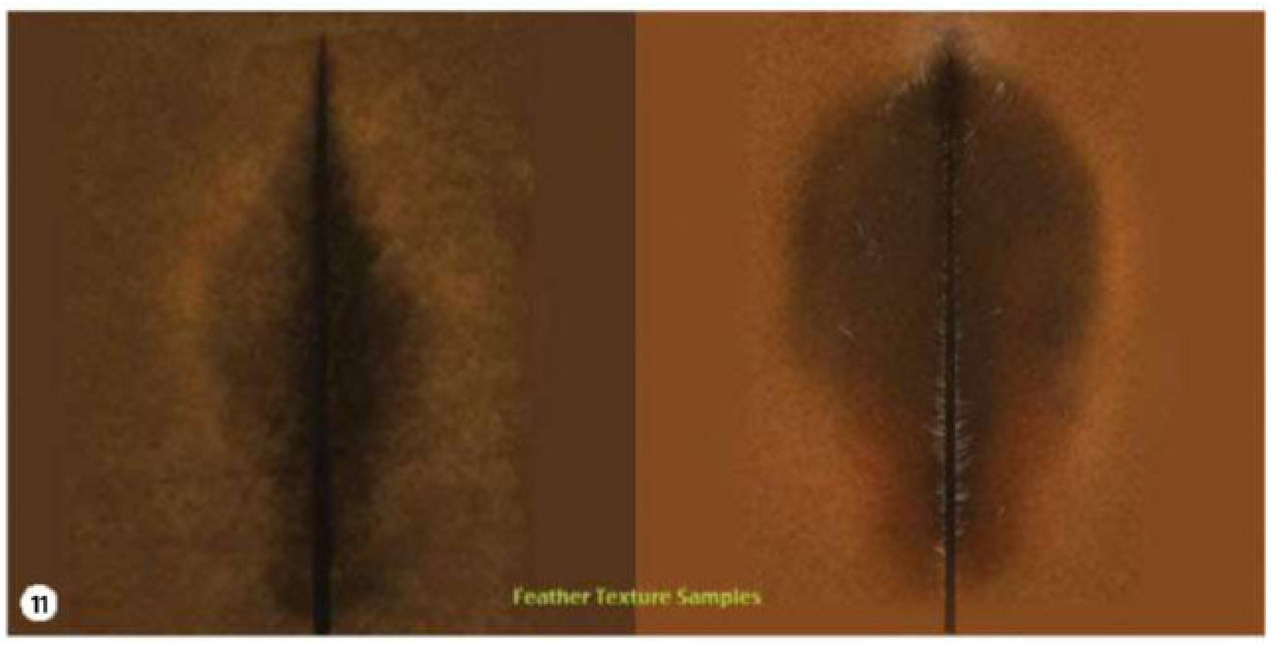




09 Use maps for additional control There are certain parameters like Density that can't be controlled easily with Guides or with expressions, so this is where Ptex maps can be handy. To create a map for any parameter, click on the arrow beside it and select Create Map. Preferably paint your maps in Maya for simplicity's sake. Nevertheless, if you want to bring in a non-Ptex map from elsewhere, open Hypershade and click on the brush icon beside the map. This will pop up a File node in Hypershade, so replace the path with your desired map. Now, when you hit the Save button, a Ptex version of that map is created internally.

10 Gain further control with expressions Expressions grant the ultimate control over your model. Even if you use all sorts of Guides and maps, the first issue you'd notice is the uniformed look of all of the Primitives. The easiest way of getting rid of this uniformity is by randomising them with a 'rand()' expression. Each parameter has an Expression field that can be used for such purposes. There are also some cases where we merely want a certain percentage of Primitives to be affected by a parameter. This can be done using the 'Stray()' function. Go to Descriptions>Set Stray Percentage and assign it a percentage value. Now this function can be used along with the expressions.



11 Texture individual feathers Luckily, a lot of the individual real-world feathers don't have so much detail on them and can be easily textured. Most feathers have a darker colour at their roots, which blends into a lighter colour at their tips. Spec and Bump maps can be either derived from the Color maps themselves in Maya with some colour remap adjustments, or you can just make them in Photoshop. It's good practice to get the most from available Color Correction nodes inside Maya rather than creating loads of textures in a 2D package that could easily be made procedurally.

Performance notices

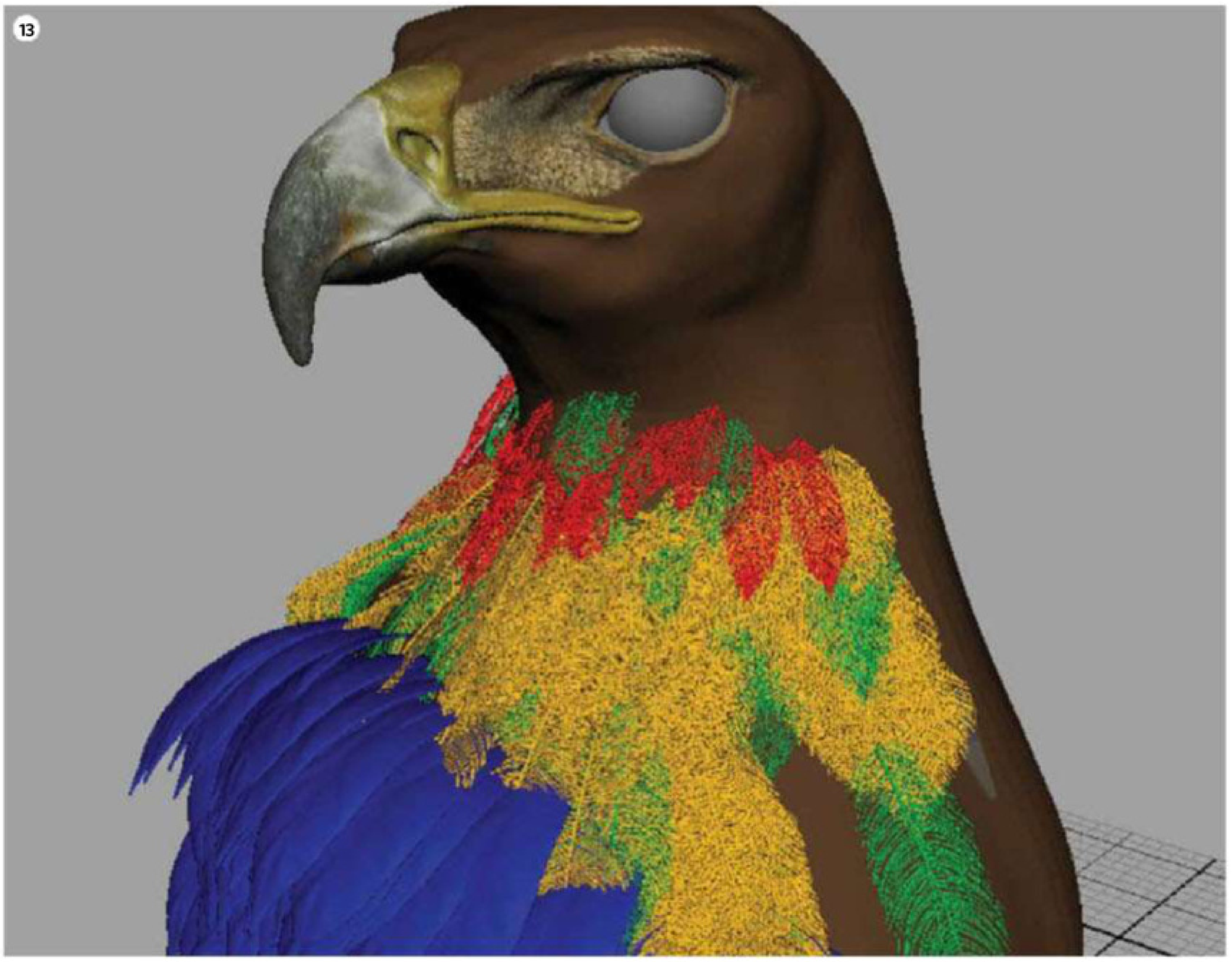
When creating Descriptions, it's better to bind them to the mesh faces instead of the whole mesh, creating the Density map afterwards. Second, on exporting Archives you have the option of specifying LODs for the Archive. It's best to create very simple LODs yourself, but alternatively the automatic reduction option works fine. Once they are added to the Description, go to the Advanced tab of the XGen window and change the Proxy Index to $aIndex*$aMul + 2. This will use the lowest-exported LOD level in the viewport. Work your way up from a low Density.

12 Combine texturing As pointed out earlier, we will be using the eagle's Color map as the Color map for the feathers. However, this does raise an issue. The feathers will have a kind of constant colour, which is neither what we want, nor is it realistic. This is where combined texturing comes in handy. Mix up your colours and textures into a blend so that you can achieve the same kind of result in your shading network by applying the same blending. I'd call this the easiest approach. As a multiplicative texturing workflow, you'll need to ensure that the Multiply blending mode is chosen. We will discuss this more in the shading stage.

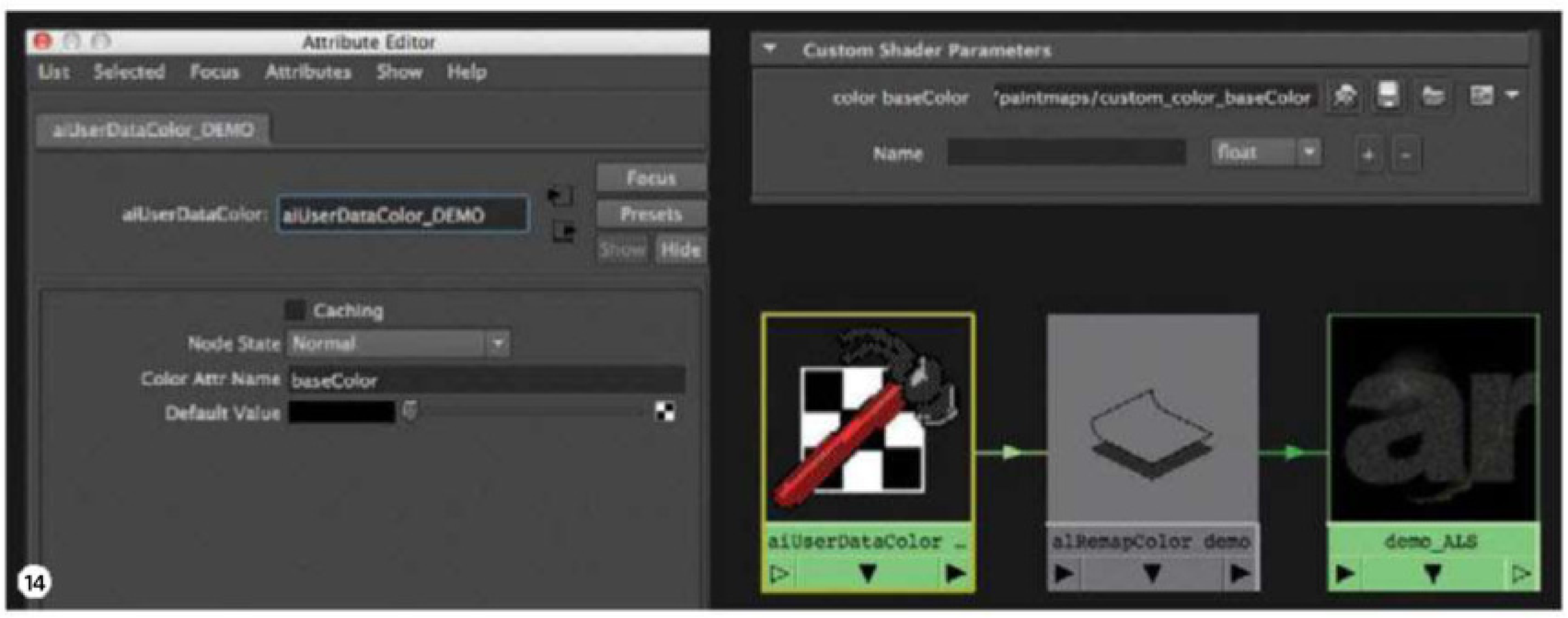
Watch out for these...

Do not hide groomable splines Descriptions. Even if you do, make sure you reveal them before closing Maya and saving the scene. This is a known bug that is slated to be fixed in Maya 2016, which causes very unexpected behaviours when opening the scene in next sessions. If you are rendering with Arnold, make sure the MtoA plug-in is loaded prior to XGen. If you ever decide to export/import grooms on a Description, make sure that you have exactly selected its bounded faces/mesh initially and don't include the mask nor the region maps in the UI if you haven't painted them.

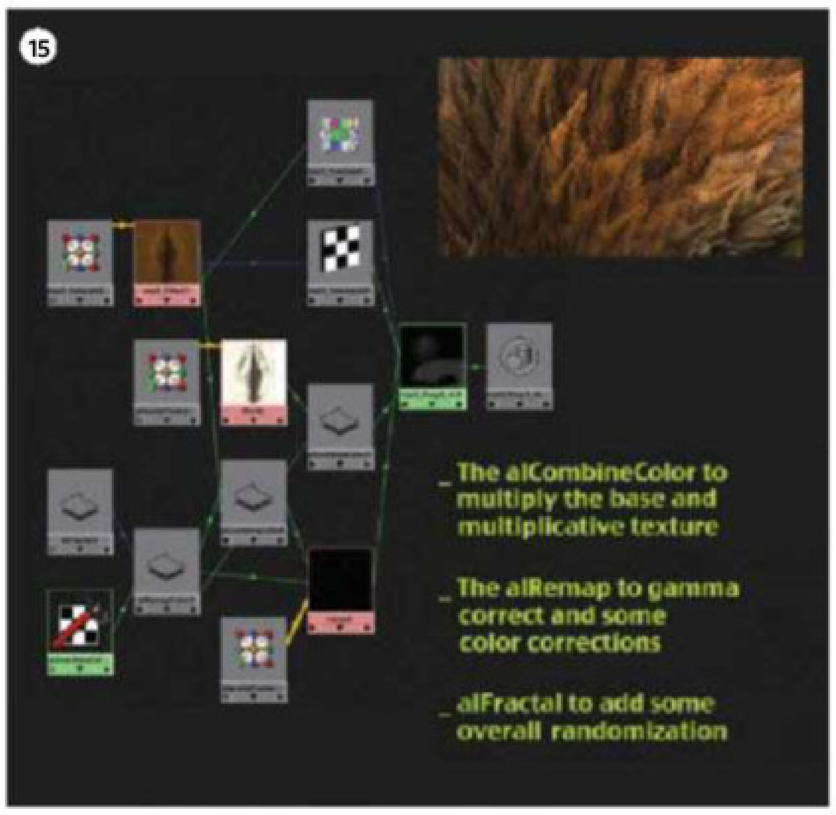
13 Get some viewport feedback Having a lot of Archives in Descriptions would make it hard for us to identify which Archive is where. To get some viewport feedback, we can alter the primitive colours according to their indices. Go to the Preview tab and open up the Expression Editor on Primitive Color. For example, if there are only two Archives, we can write '$a = $aIndex == 0 ? [1,0,0] : [0,1,0]'. This means that the Archive with Index 0 would be assigned the colour red and anything other than that would be green. This simple code really helps a lot when it comes to visualising the Archives.



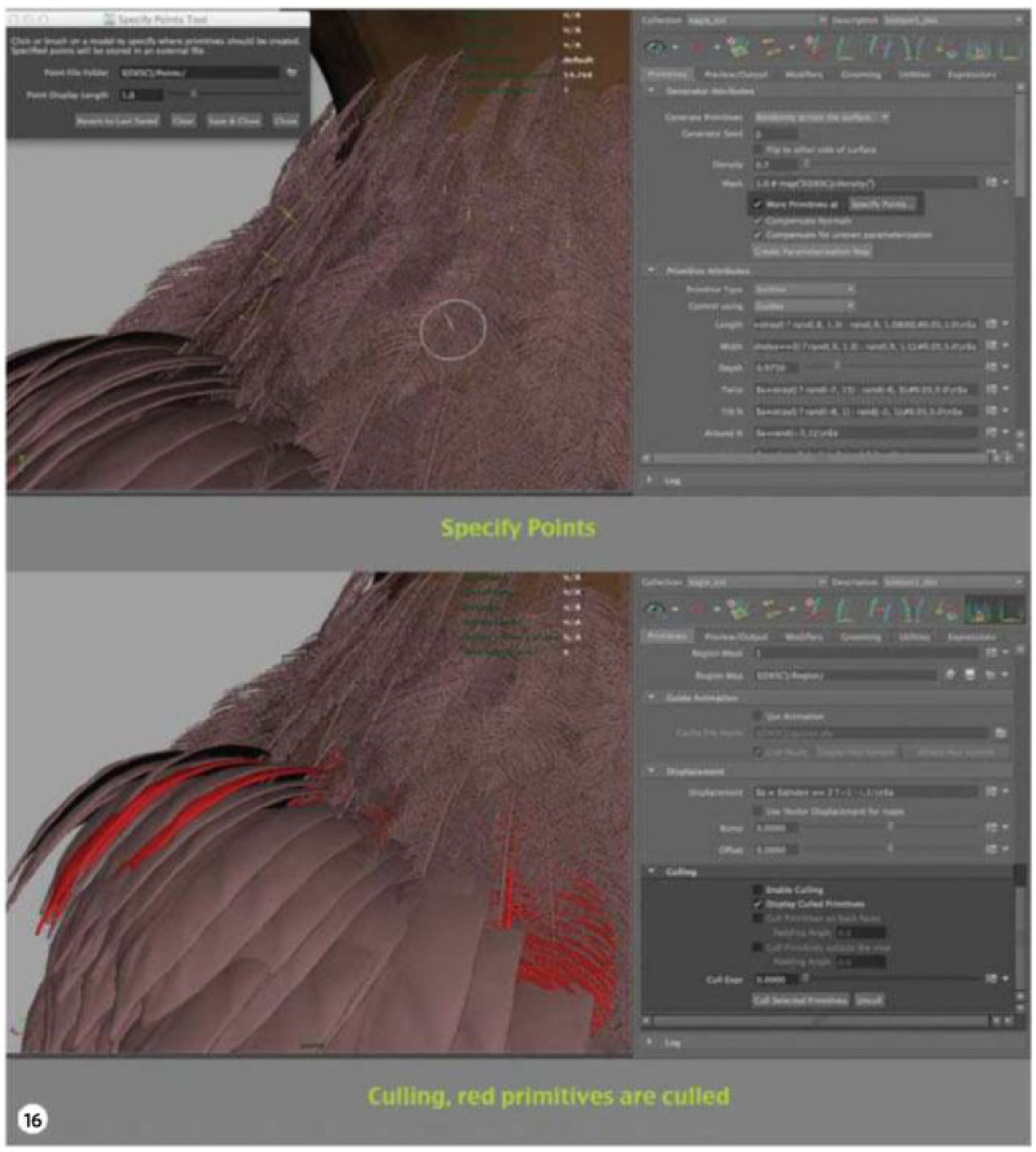
14 Introduction to shading Anders Langlands has written an amazing set of Arnold shaders called alShaders that are perfect for production. All of the objects in the scene should be assigned alSurface shaders. In order to shade feathers from a single Color map that's based on the eagle's UV, go to the Preview tab and create a custom Color Parameter, name it baseColor and give it the main Color map. Afterwards, create a userDataColor node, in the Attribute's name put baseColor and then connect it to the Diffuse slot of the feather shader. At this point, the feather colour will be derived by that texture.



15 Combine shading Earlier we discussed combined texturing or rather, for reasons to do with simplicity, multiplicative texturing. To achieve a decent multiplicative shading, first save out a texture with a white background that would work nicely when multiplied on a feather's constant colour. All you need to do now is to create an alCombineColor, plug input1 to the userDataColor node and input2 to the texture you just saved out. To further randomise the output, you may want to pipe the combined texture through an alJitterColor. Note that userDataColor is not Gamma-corrected by Arnold, so that should be done manually.


15
The alCombineColor to multiply the base and multiplicative texture
The alRemap to gamma correct and some color corrections
alFractal to add some overall randomization

16 Art-direct XGen One of the key features of XGen is its intuitive art-directing toolset. The most common elements of these are Specify Points and Culling. For areas that need extra care, start with a medium density and then fill the gaps with Specify Points. For each point you place, a Primitive will appear there and to remove a point, Cmd/Ctrl-click on the point. There may be some times that you may see Primitives intersecting with each other – to avoid this, click on the Cull icon and MMB-drag the region of interest, then click the Cull Selected Primitives to hide the intersecting Primitive.



17 Final words To render XGen with Arnold, go to the Preview tab and switch the Renderer to Arnold. This will allow you to make use of Motion Blur and Min Pixel Width in case you are rendering splines. If you plan to batch render, make sure you have already exported the patches from the File menu and Guide Animation to caches. To conclude, XGen is a powerful tool and, like every other new tech, it comes with its own set of issues. Fortunately it will be fully ironed out in the future, which will make it a perfect tool for all sorts of projects.

Groomable splines

Groomable splines are a Primitive type that is perfect for short hairs. It has its own set of grooming brushes that lets you groom a specific type of hair right inside Maya without the need of any Guide curve. The brushes you'd probably use the most are Pose and Length. As a tip, to decrease the length, you have to make Increment a negative value. You can groom one side of the mesh and mirror it to the other side using the Flip icons, however be aware that this mirroring currently only works across the X axis.

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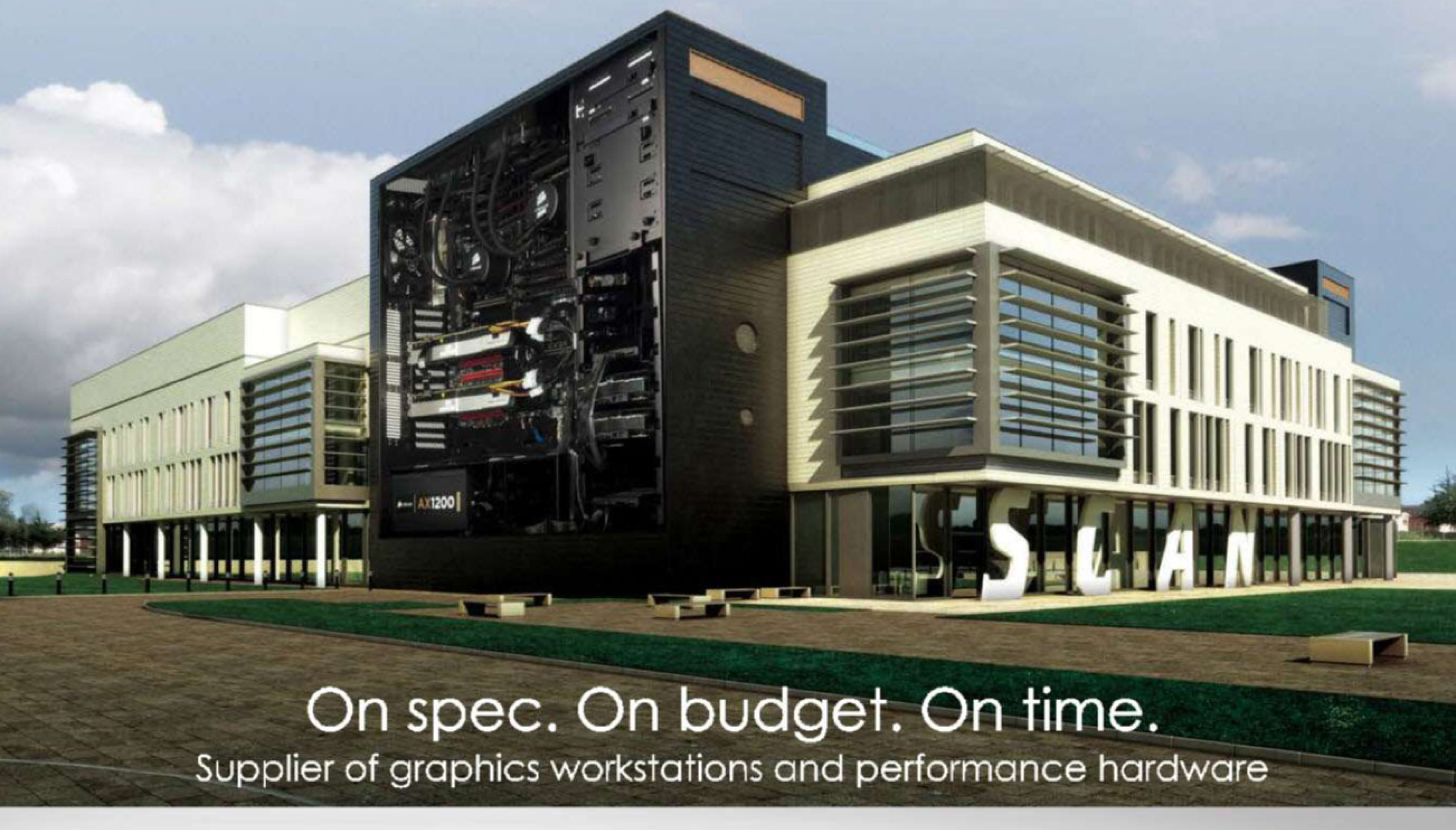

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Technique focus

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MODELLING As the caterpillar is made of separate parts, I started with DynaMesh spheres activated at lower resolutions. I then used ZRemesher to create a clean topology for each part, using the Move, Clay Tubes and the Standard brush for detail. I also used some Alpha brushes with skin textures, then painted the body using polypaint. **Glossy Nature,** 2014

Nicolas Delille
3DArtistonline
Username: ModernAgeStudio

Website
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Country France
Software used ZBrush, Cinema 4D, V-Ray, Photoshop

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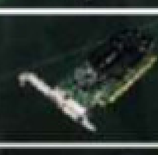
NVIDIA Quadro K620 VCQK620-PB	
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ZBrush | 3ds Max | V-Ray | Photoshop

Step by step

Easy-to-follow guides take you from concept to the final render

Daniel Bel

3DArtistonline

Username: danielbel

Personal portfolio site www.danielbel.com

Location Buenos Aires, Argentina

Software used ZBrush, 3ds Max, V-Ray, Photoshop

Expertise Character sculpting, texturing, shading and lighting

Sculpt dynamic forms

I am Beowulf 2014

I am Beowulf is a diorama that portrays a critical moment in one of the character's fierce battles against a sea monster

Daniel Bel is a 3D artist and art director for advertising and different types of audiovisual media

The tools in both ZBrush and 3ds Max are very handy, especially when it comes to sculpting anatomy. Over the next few steps we'll discover methods in these programs to sculpt a heroic character.

For the creation of Beowulf, our main character, we will start from a base mesh, where we will focus on how to obtain a dynamic, heroic pose. At the same time as this, we will be trying to model a masculine and well-defined, muscular anatomy, using the default sculpting brushes in ZBrush along with some other customised brushes in order to achieve different types of effects.

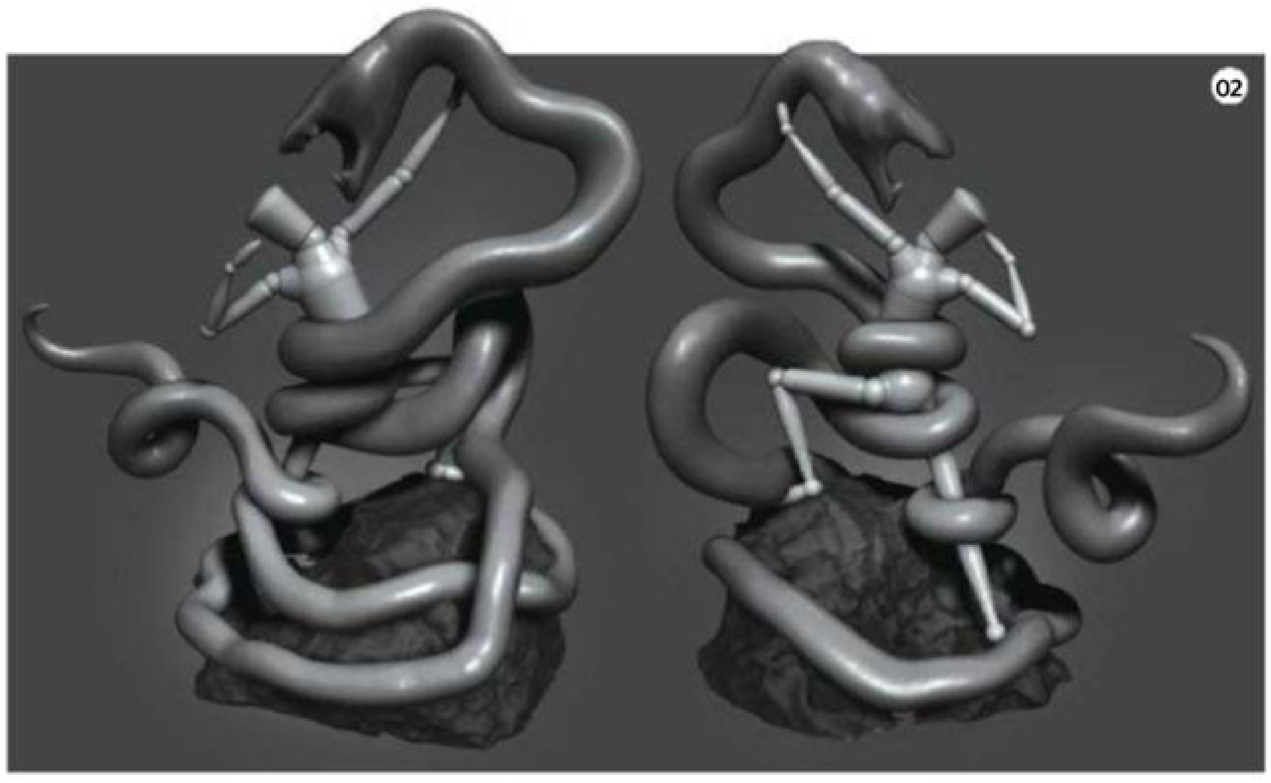
Then, we will learn how to use more advanced techniques like ZSpheres and DynaMesh along with simpler ones, such as masks and Mesh Extraction, in the design and creation of the sea serpent. After that, we will begin detailing, which will help us to make our characters look more natural.

We will also use Decimation Master in order to create a model of lower-polygonal resolution. This will allow us to easily export the file to 3ds Max, where we can add materials and illuminate the model how we like.

Last of all, we'll make the most of V-Ray for rendering, then post-process our scene in Photoshop.

01 Pre-production Before starting to work on this piece, we need to have a clear picture in our mind of what we want to do, so that we can define how we are going to do it. The pre-production stage is one of the most important ones. At this point we need to look for all different kinds of references, whether that's visual, textual or of any other kind, as these will help us form our main idea. In this particular case, I used references from different sources: the epic poem 'Beowulf', the 2007 film of the same name, and many online images.

02 Think about composition With all the information at hand, it's time to think about the best way to show our piece. For this, it is necessary to begin sketching what we have in mind, whether that means drawing it or by doing it in 3D – however, always make sure that you have a rough draft so it does not consume too much time. This will give us the chance to play with shapes, poses and elements of our scene.



03 Understand the character It's time to be more meticulous with our work. In this case, Beowulf is the most important element. For that reason, we want him to adopt not only a heroic pose, but also a natural and realistic one. Therefore, it needs to be a pose that a human being can perform. For hands-on reference, I chose to act as if I were the character. Obviously the character and I are different, but this helped me see how the pose works.

Take pictures for reference

Besides taking photographs for general pose references, we can also take pictures for details, as we won't always find everything we need online. For example, in the case of this piece, I took many pictures of my hands and feet to study the reaction of the skin, tendons and veins when I adopted positions similar to those of the final piece. This is useful for clothing references, as it means we can see how creases work with different fabrics and surfaces.

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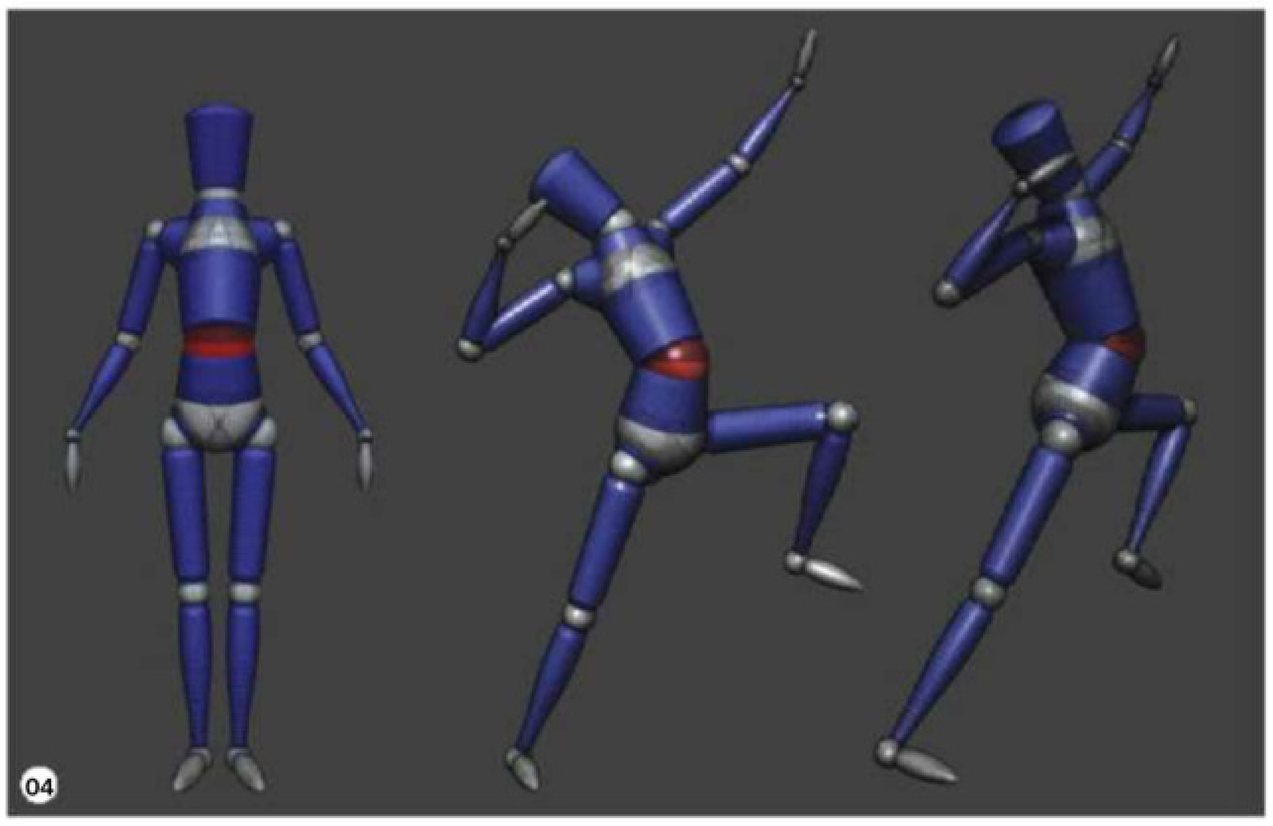
Learn how to

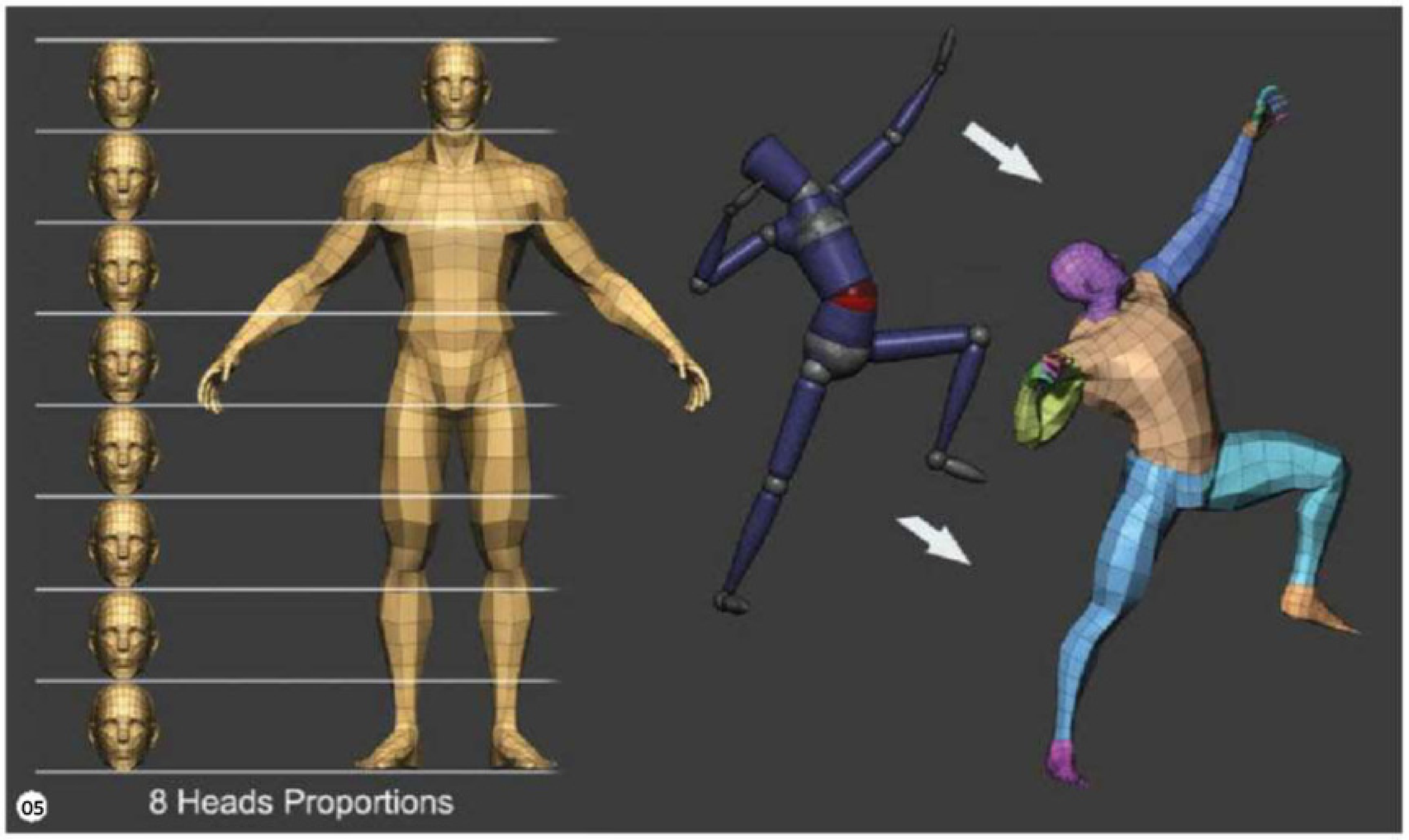
- Design characters
- Make a dynamic pose
- Sculpt realistic anatomy
- Create fine details
- Export and manage scenes
- Set up light and materials
- Render and composition

04 Use Mannequins A tool that isn't very widely used by the majority in ZBrush is the Mannequin function. This tool consists of a character created from ZSpheres, which will enable us to pose our character in a simple, practical and fast way, simply by using the Rotation tool and without losing the original proportions of the figure. In this case, I copied the pose from the previous reference photographs. I was then able to correct or exaggerate certain elements that I thought were appropriate for the character.

05 Use a base mesh With the pose already defined, the next step is to import a base mesh that has been previously created as a new SubTool into ZBrush. This is a base mesh that I tend to use for characters with heroic proportions (eight-heads tall). We need to place the base mesh on the Mannequin, and using the Transpose tool, try to match it to the pose of the Mannequin. Once we've done this, we'll have the main character mesh that can be subdivided in order to start refining the geometry and keep working.


04

06 Create the muscles The first step we must take into account in order to start working with muscles is to mark certain bony protrusions, called bony landmarks, that will work as guidelines to sculpt every muscle. Once identified, use the Clay Tubes brush to sculpt each of the muscles, taking into account its shapes and volumes according to the pose of the character's limbs. To do this properly, we need to use as many anatomy references as possible. It is very important to know what our body is like and how our muscles work, particularly when putting a character in such an extreme pose.



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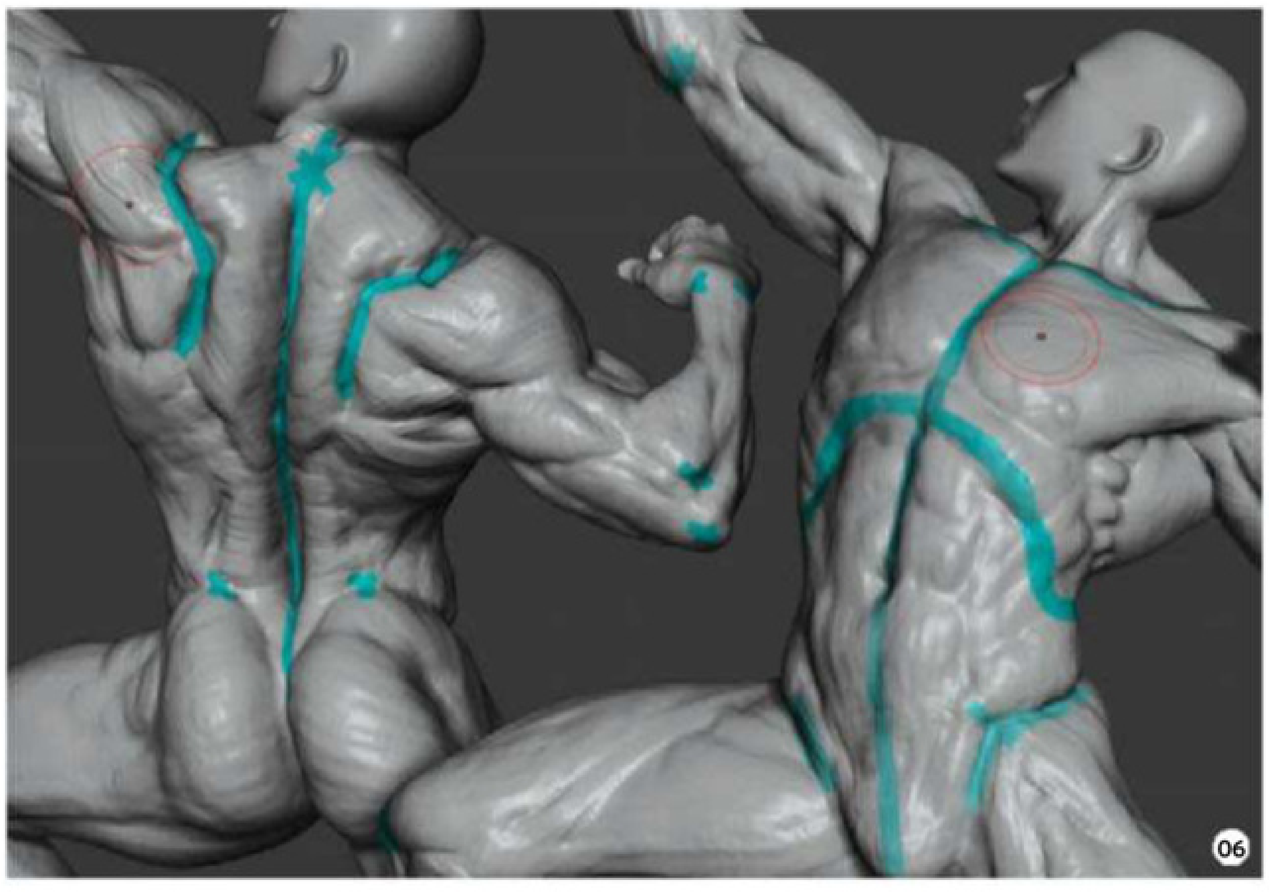
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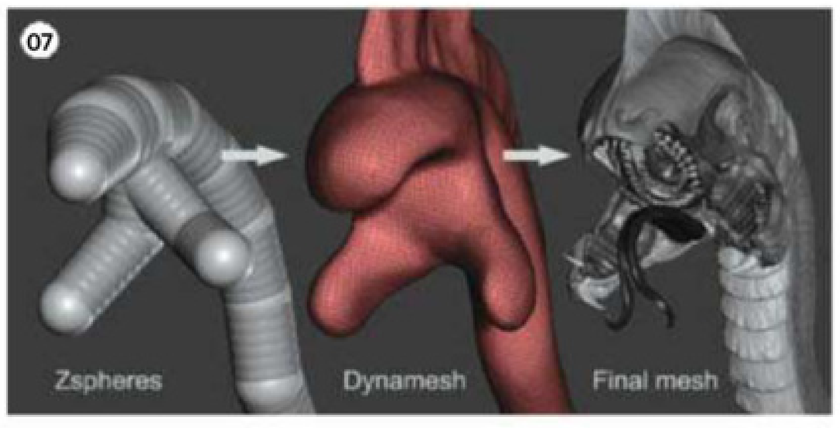


07

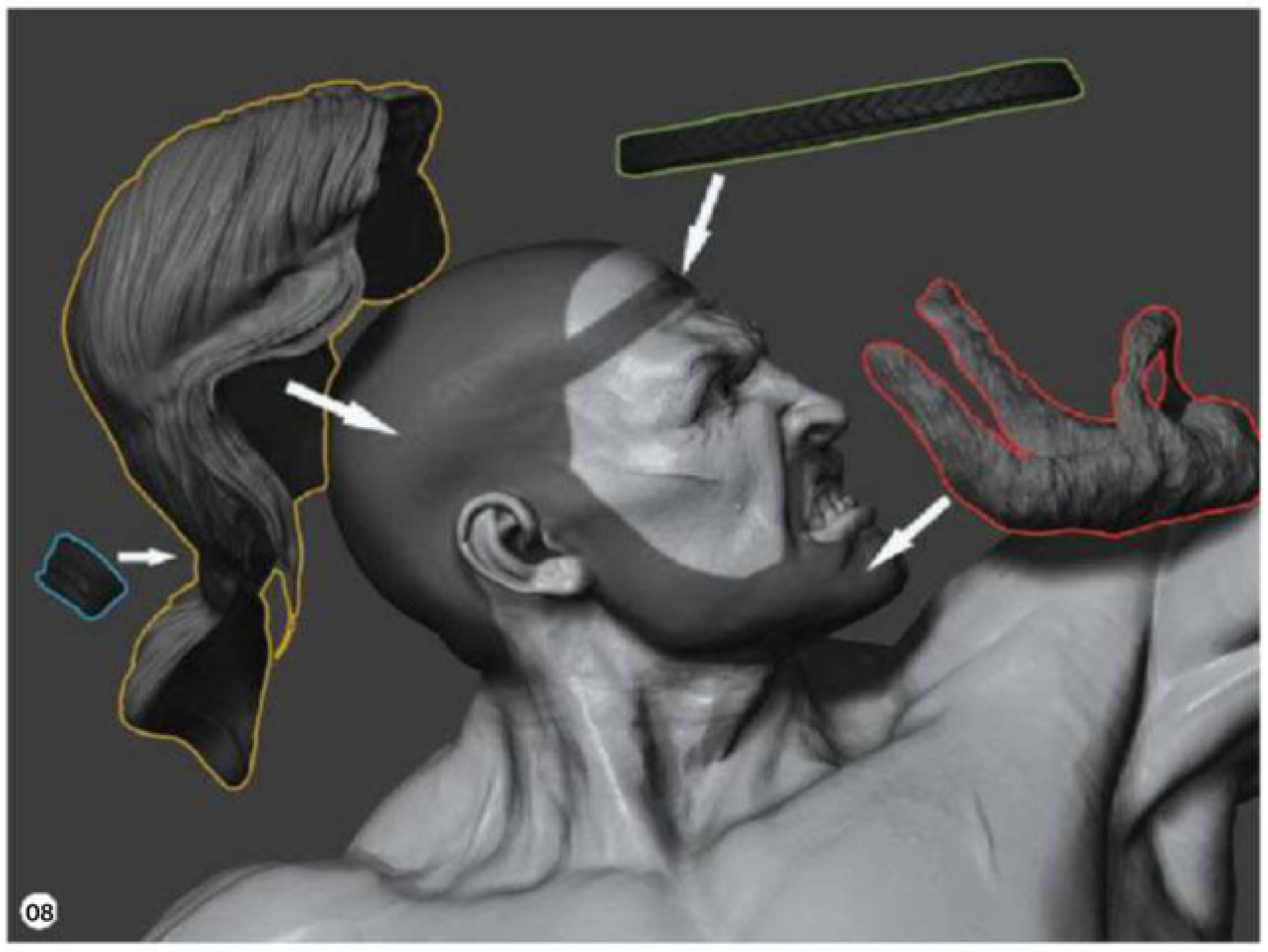
07 Design the monster This is the most creative and free stage of the modelling process. Use ZSpheres to start creating the body of the serpent, as it is a practical and dynamic way to obtain a cylindrical and continuous shape. After acquiring the basic shape, press the A key to convert it to Adaptive Skin, then convert it to DynaMesh to start playing with the shapes of the head and other details. In my project I wanted it to look like a sea serpent, so I masked all of its back so that I could create the fin from the SubTool panel with the Mesh Extract. I did the same for its belly.

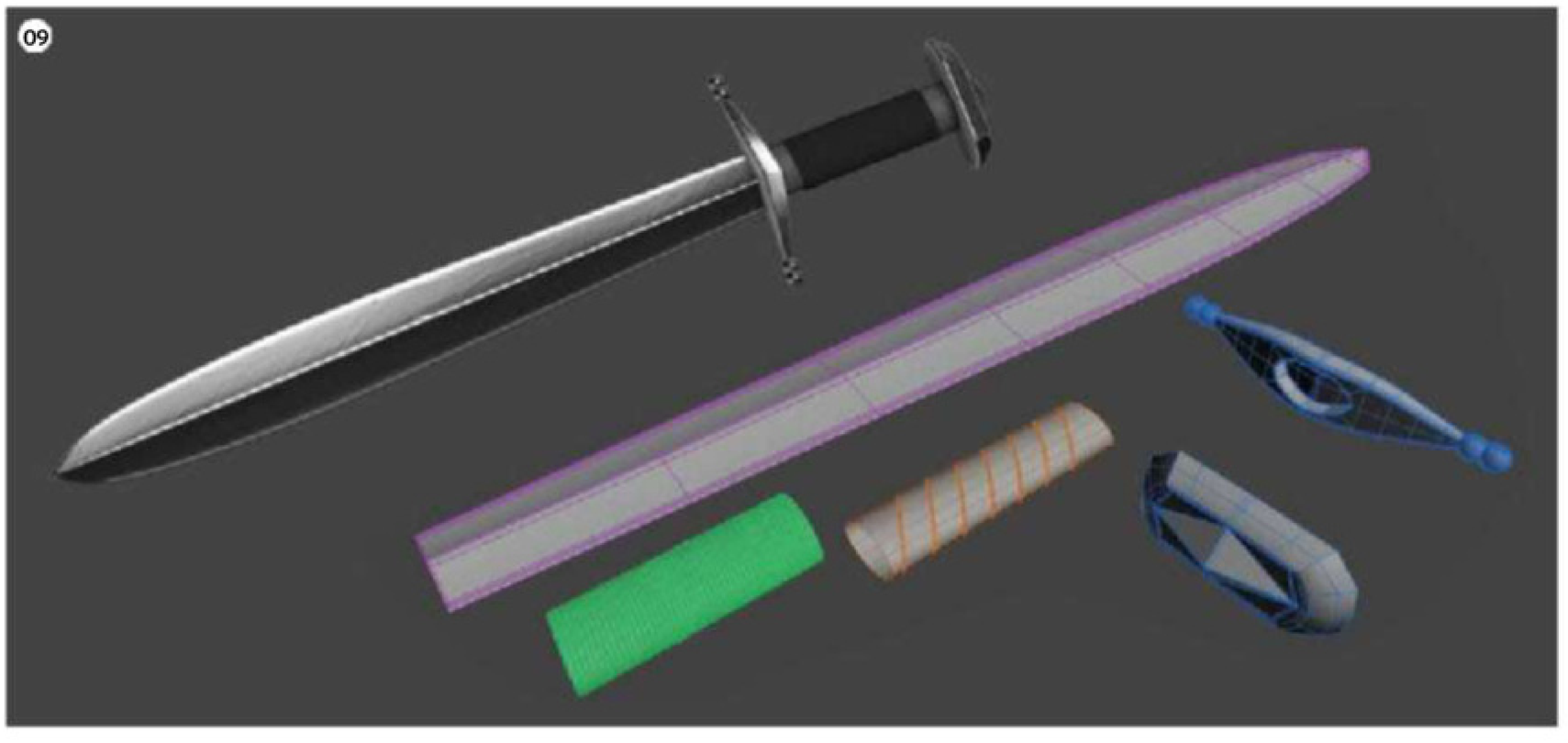
Concept

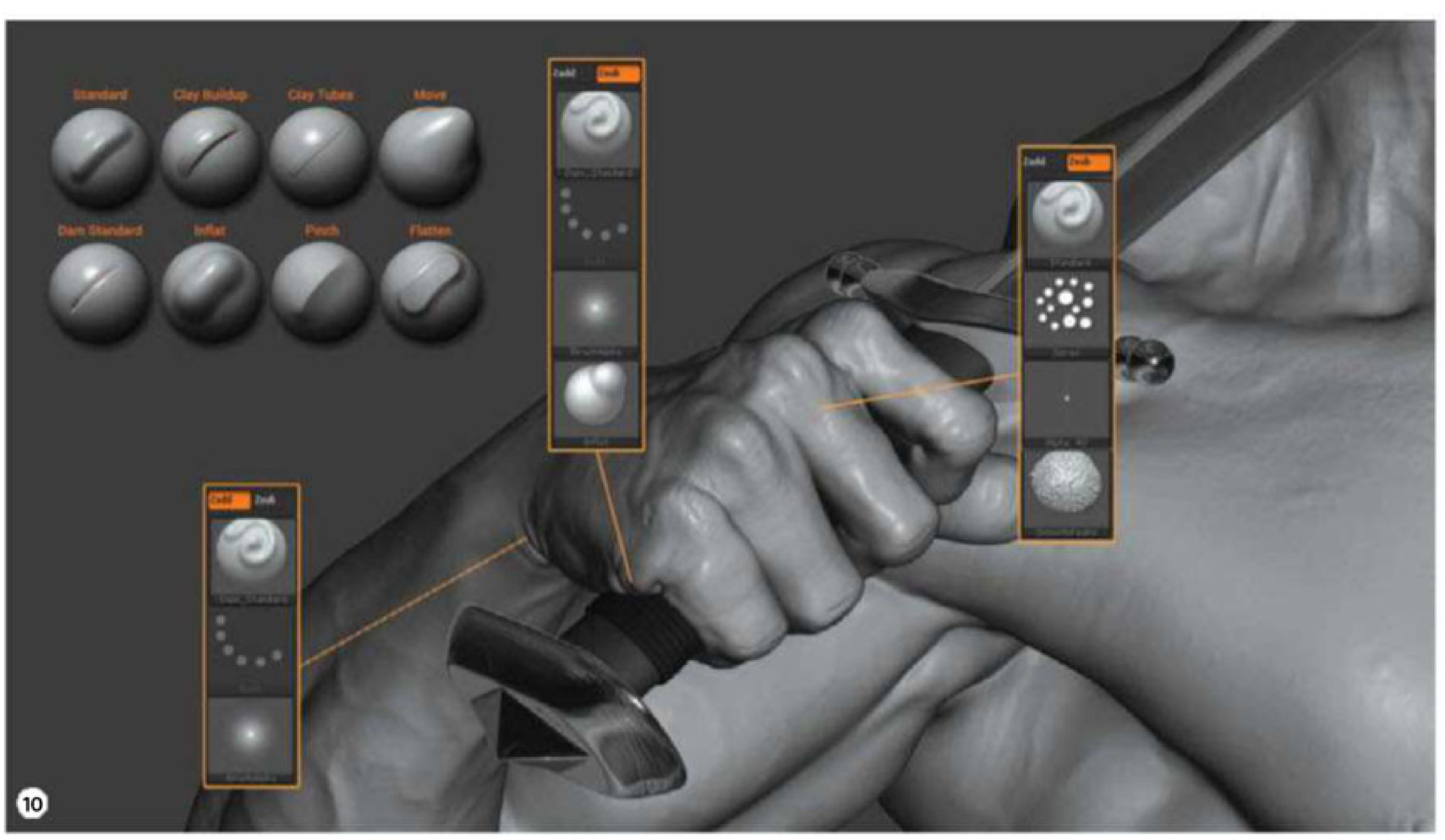
In this diorama I wanted to depict the strength, bravery, heroism and anatomy of a great character such as Beowulf.

08 Extract and create accessories One of the many advantages of working in ZBrush is the Mesh Extraction feature. Simply by masking any part of our model and then clicking on Extract, we can generate a new tool of the masked portion within the SubTool panel, meaning we can get all kinds of basic shapes and use them as accessories. In the case of Beowulf, I used this feature to create his beard, hair, headband and shorts. As I have already explained, I also created some parts of the monster in the same way. I also used the Insert Mesh brush for the fangs, among other things. It's these kinds of details that will bring your character to life.

09 Make the sword For the creation of hard-surface objects, I usually combine 3ds Max and ZBrush. For the sword, I created the entire base in polygons, working with subdivisions in 3ds Max. As a blueprint for these, I used an image of the original sword used in the *Beowulf* movie. I then modelled a base mesh and exported it to ZBrush, where I used DynaMesh to join certain parts of the handle, and the retopology function with ZRemesher to achieve a cleaner geometry. Like before, it's the finer details that make your image more realistic, so I added scratches to the blade.







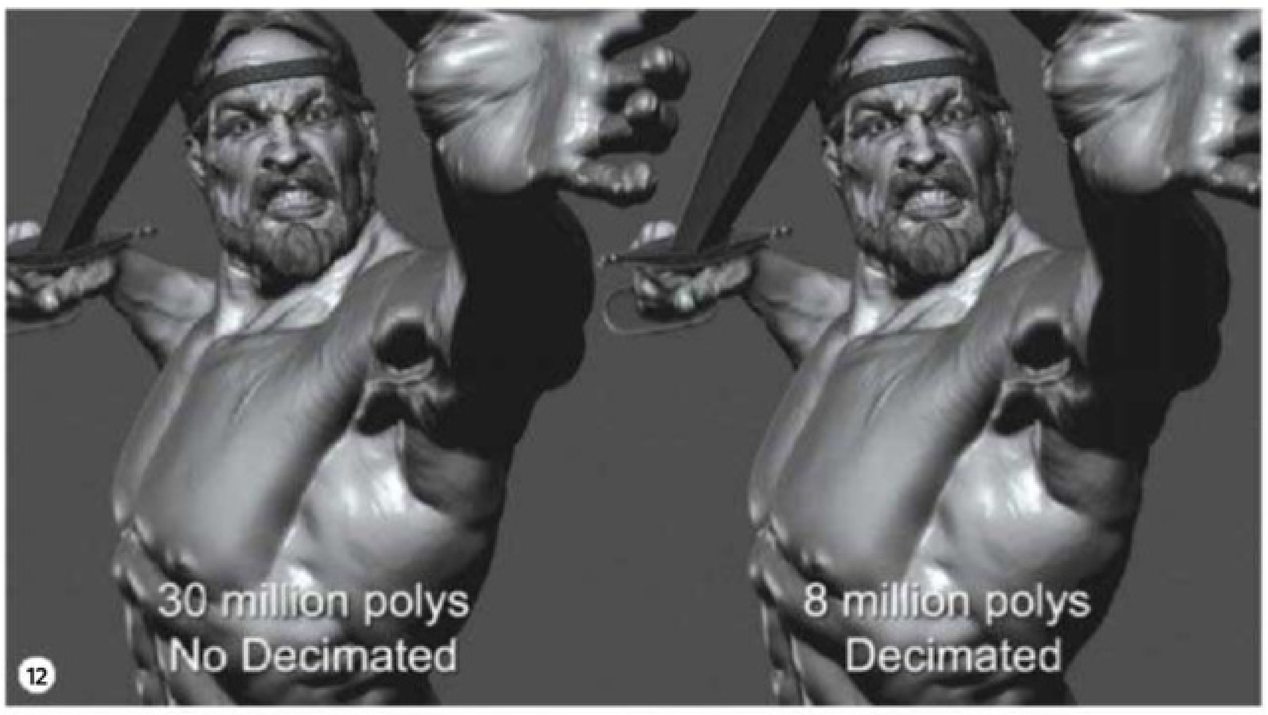
10 Add the final details This last stage of modelling is when we must keep an eye for detail in order to take our figure to the highest level of quality possible. As always, use reference images and your imagination to add the small final details to really emphasise the reality of your work. For the skin wrinkles, I usually use the Dam_Standard brush together with the Inflate brush. I also used the Standard brush with the Stroke set to Spray in combination with Alpha 40. Then smooth it with the Smooth Peaks brush for porous and rough surfaces.

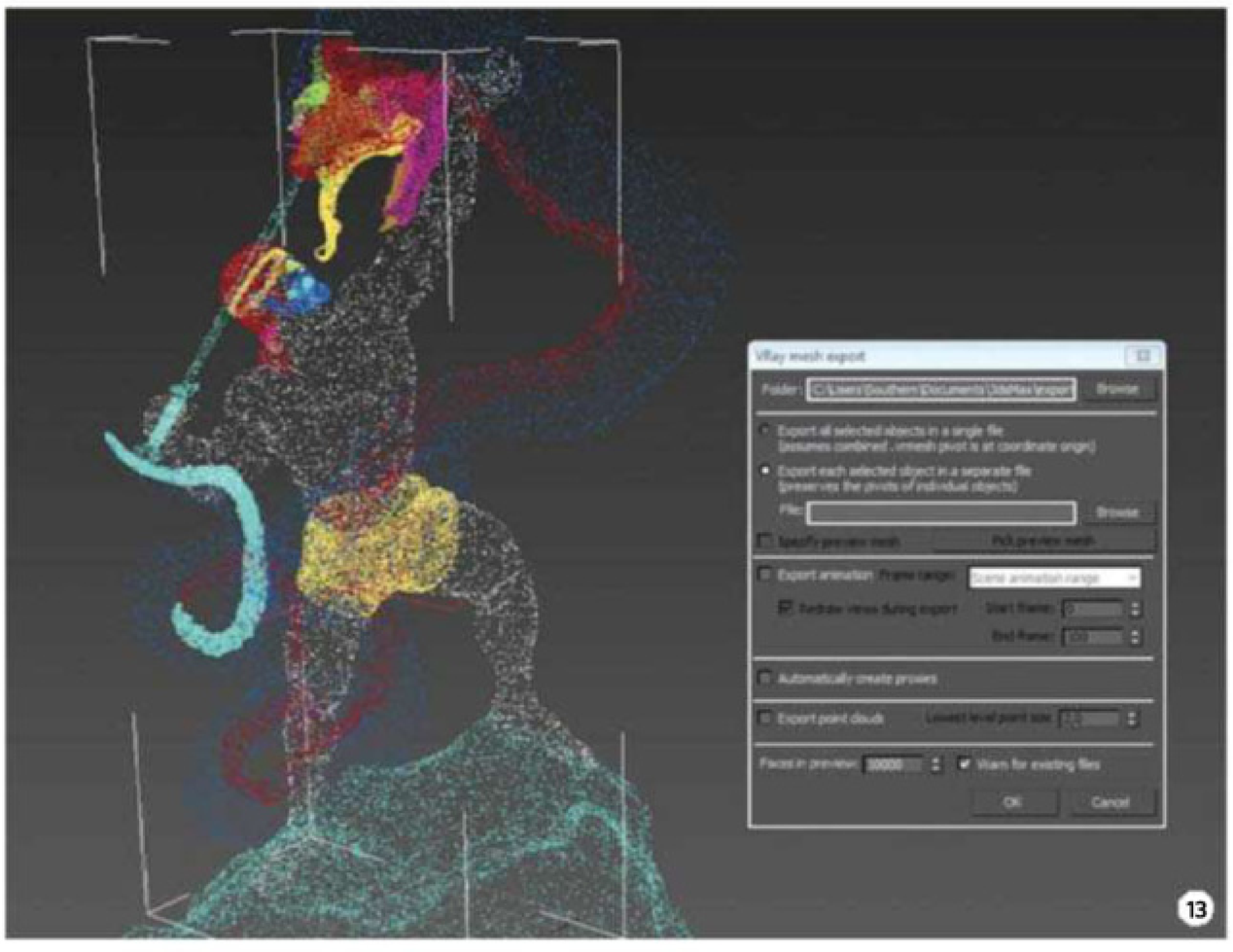
Find the best workflow for you

From my own personal experience, this series of steps for the creation of Beowulf is the most convenient way to do it. However, it is not the only method you can use. I recommend that all artists try to find their own workflow in relation to their skills and needs. ZBrush is an amazing tool for your creativity, so don't waste it!

11 Clean and merge SubTools Before exporting the scene to 3ds Max, it is important to have our SubTools labelled and free from any hidden or unnecessary items. It is also useful to try to group them so as to avoid having too many separate elements. So, if we have five SubTools, each of them with just a part of the sword, we can group them in a single SubTool titled Sword. To do this, we just have to go to the Merge menu and choose the option that suits us depending on the order of our SubTools.

12 Decimate the model In the case of Beowulf, I knew my only intention was to export the scene to 3ds Max to render different views of it. I decided that instead of retopologising each element and investing time in this process, I would use the Decimation Master function in order to get a reduced number of polygons that 3ds Max could import for a later render. For this, go to the Zplugin menu>Decimation Master>Pre-process All. This will pre-compute each element of the scene. Next, press Decimate Current, testing to see what the correct Decimation Quality value is for each SubTool.

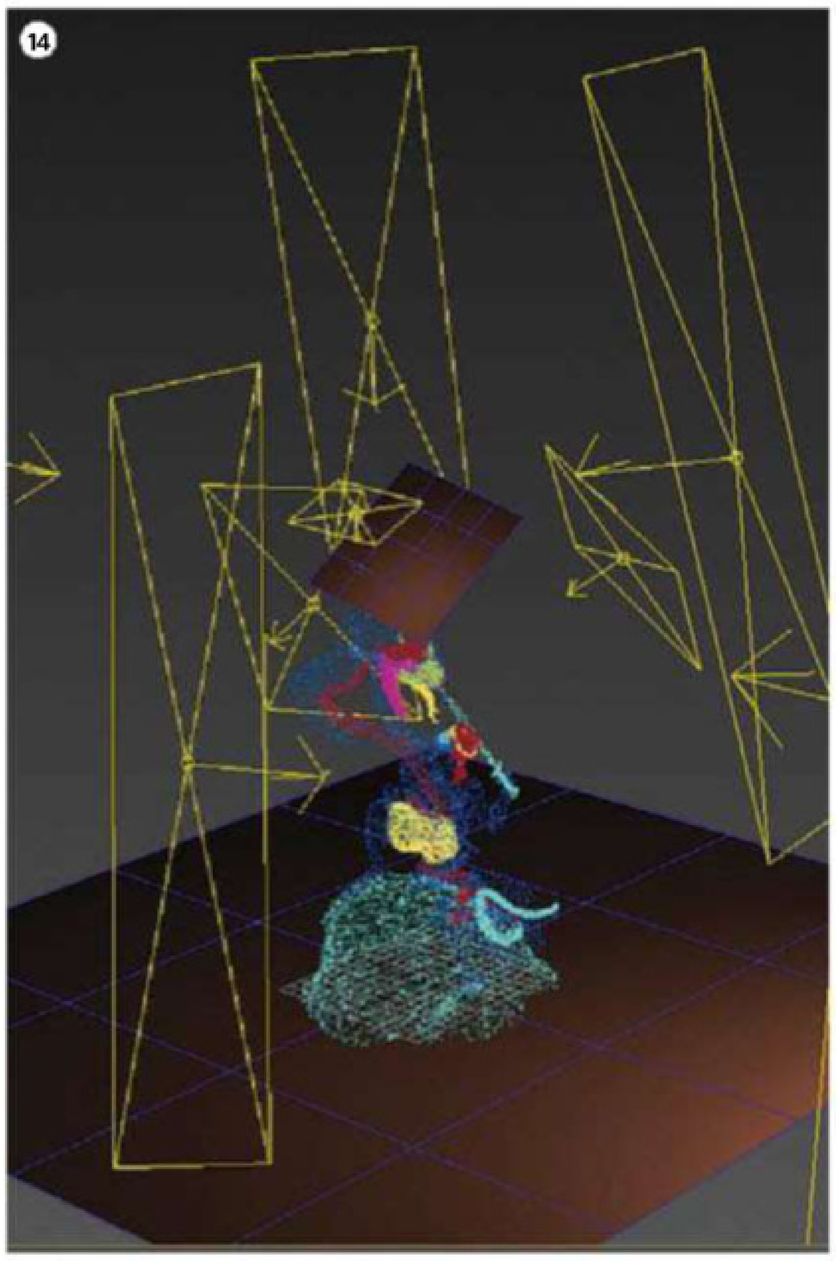




13 Export and import Once all our SubTools are organised and decimated, use the GoZ All function (which is within the Tool panel) to export all of the SubTools simultaneously. This tool exports from ZBrush and automatically opens 3ds Max, importing all objects into a new scene. Once the scene in 3ds Max has the full model ready, use V-Ray's Mesh Export function to create proxies of each item so that you can navigate fluidly in the Viewport. The proxies load just at render time.

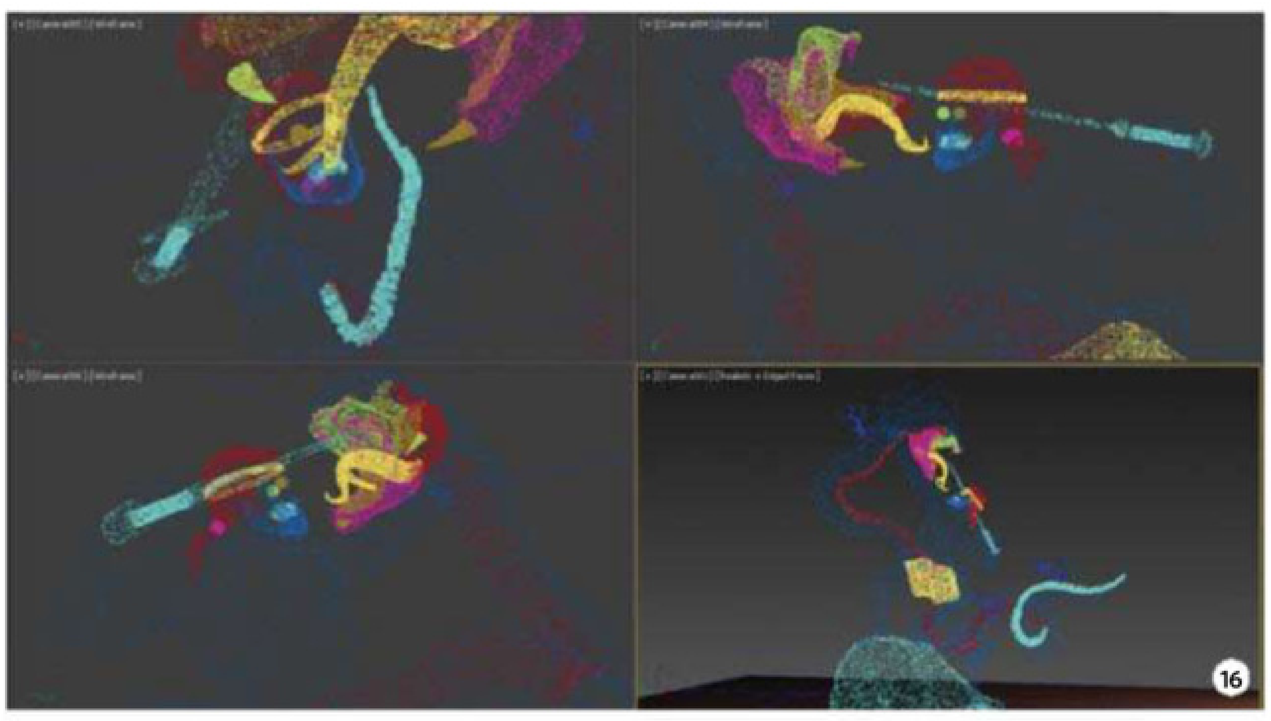
Retopologise with ZRemesher

Another method used to transfer all the details of a SubTool with millions of polygons is the using ZRemesher and the Project function. To do this, we have to duplicate our current SubTool and apply a ZRemesher to it, setting the parameters for a suitable topology. Then, from Geometry, subdivide the geometry as many times as necessary. Last, go to the Project menu of the SubTool panel and click on Project All. We will then get a tool with several subdivisions and all the details of the original piece. We can then extract the Displacement or Normal maps to export them along with the low-res version of the model.



14 Set up the lights This process and the following one are as important as all the previous steps, since through these we will really emphasise and bring to life all of the modelling that we've already done. Therefore, it is advisable to have some inspirational images to hand that will help to inspire the final look of our sculpt. I usually use several VRayLights scattered around the scene along with HDR images. Test each light separately to see how each of them affects the model before creating another one. In this way, each light has a specific function and we are able to manipulate them according to the look we want to generate.

15 Create the shader We'll use just one material for Beowulf. The idea is to create a look similar to a polished stone with some sparkles and some dirt diffused on it. The point of this look is simply to highlight the volume and shape of the figure, without getting lost in complex or flashy textures that would distract our focus of attention. To do this, use a VRayMtl with a VrayDirt applied in the Diffuse channel and a Fresnel reflection with a small Noise map. Only with that and playing around with the lights can we get this effect for the project.



16 Cameras and render Finding the perfect angle where we can show both a correct composition while at the same time presenting the drama of our piece is not an easy task. As Beowulf is no exception to this rule, place several cameras in order to make some test renders. For every camera that we create, feel free to move around some (or all) of the lights in the scenes until you manage to generate the desired effects on each shot – not every light is going to look effective in each render. V-Ray is the render engine that I generally choose for all my works.

17 Final composition When it comes to post-processing the image, it's best to use Photoshop for stills. Here, compose the original render, stressing particular areas and reflections by using selections and masks and different kinds of blending modes. In my scene, I decided to make the background entirely black with a free stock image of smoke to add a sense of drama. Last of all, I applied some stone textures with the blending mode set to Overlay at a low Opacity. It's also worth doing some colour corrections and adjusting the contrast levels. Once we've done this, flatten the image and use the Burn tool to emphasise areas, creating points of interest.

Constructive criticism

From my point of view, comments and constructive criticism on your work are one of the best ways for you to understand whether what you're doing is working or not. Beyond our taste and personal style, we must realise that other people's opinions are very important as well, whether they are a viewer or industry outsider's, or a more experienced colleague's insight. We need to learn how to take criticism in a positive and productive way in order to develop our work and grow as professionals.

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2013 Scientific and Engineering Award To Ofer Alon for the design and implementation of the ZBrush software tool for multi-resolution sculpting of digital models. ZBrush pioneered multi-resolution digital sculpting, transforming how artists conceive and realize their final designs. ZBrush has enabled artists to create models far more quickly and with much greater detail than previous approaches.

Technique focus

Incredible 3D artists take us behind their artwork

MODELLING We used ZBrush to block the main shape of the helmet, starting from a single sphere. Once satisfied with the forms, the mesh was brought into TopoGun, where every panel was created as a single, low-poly object. The details were then captured using the Projection feature in ZBrush and used as Normal maps in the final render. This approach is great, as it enables you to focus on the shapes of your sculpt. **Locust Helmet,** 2014

Davide & Mario Doni

Website www.behance.net/DavideDoni, www.behance.net/MarioDoni

Country UK

Software used ZBrush, TopoGun, Maya, NUKE

Bio Mario and Davide are twins who graduated from Escape Studios

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Step by step

Easy-to-follow guides take you from concept to the final render

Ben Simonds

Personal portfolio site www.bensimonds.com
Country UK
Software used Blender, Photoshop, ngPlant
Expertise Modeller, sculptor and texture artist working at a London-based studio

Create a fairytale castle in Blender

Mountainside Castle 2014

"An image of a towering castle perched on the side of a mountain, inspired by medieval architecture"

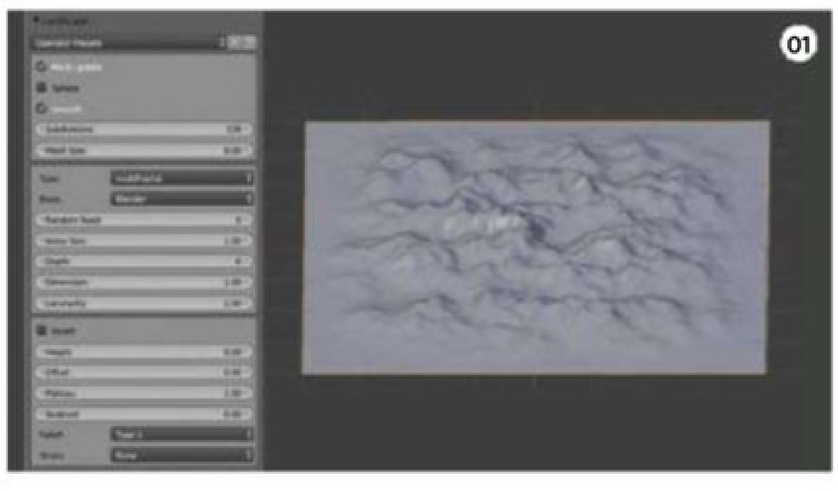
Ben Simonds is a 3D Artist at Gecko Animation Ltd, a small London-based studio

For this image I was inspired by Romantic-style architecture, such as Neuschwanstein Castle in Germany, to create a towering building nestled on the side of a mountain, surrounded by forests and steep hills. Over the course of this tutorial, I will explain how exactly I went about both making the castle itself, and then how I created the surrounding landscape.

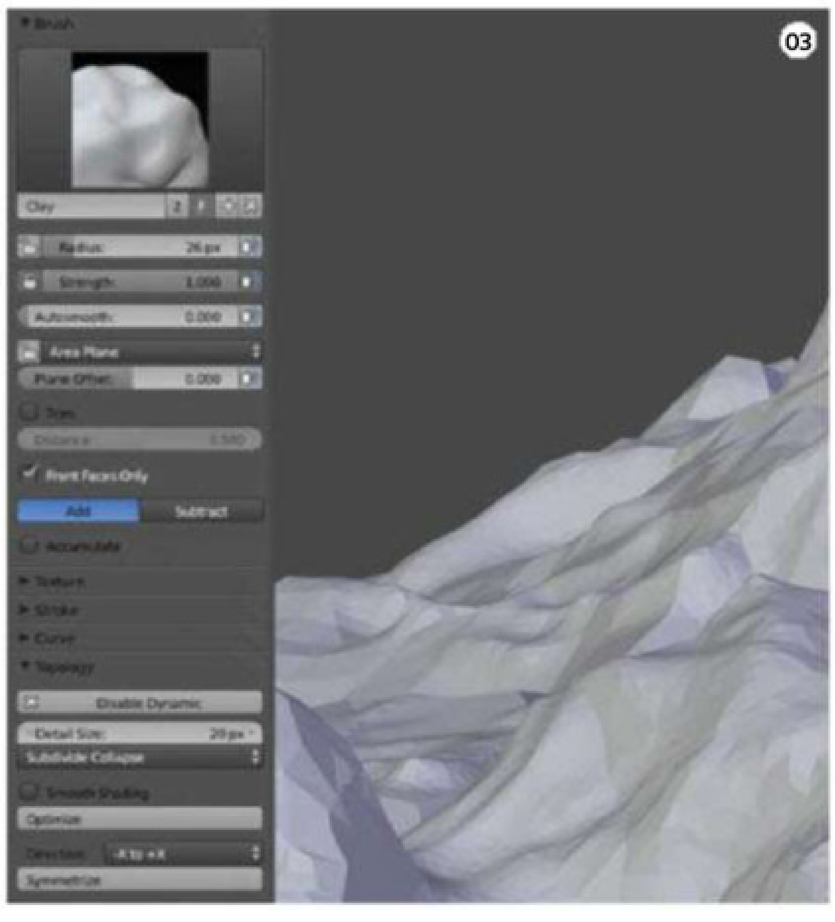
Starting with Blender's ANT landscape plug-in, we'll create some procedural mountainous terrain, then block out the basic forms of the castle with Blender's modelling tools. Next, we'll jump over to ngPlant, a free app that lets you create procedural plants. Last of all, we'll head back to Blender to create a procedurally generated forest around the castle before we eventually texture and render the scene.

01 Generate terrain Our castle will need some mountains in which to exist, so let's begin by using Blender's ANT Landscape Creator add-on, which generates procedural landscapes. Enable the add-on from Blender's User Preferences>Addons menu – it comes bundled with Blender, but you need to enable it – then go to Add>Mesh>Landscape to generate a new landscape. This script provides all sorts of settings for tweaking the kind of terrain generated. Next, turn up the number of subdivisions and increase the mesh size, then play around with the other settings to get something you're happy with.

02 Choose a site With the terrain in place, start looking for somewhere to situate the castle. To do so, use Blender's Fly Navigation (Shift+F in the 3D Viewport) to zoom around the scene in first-person, looking for the right place to put the castle. We need a small peak next to some larger mountains to place the castle on, so that it'll have the taller terrain as an impressive backdrop. With the site chosen, simply place down a cube to mark the castle's site for the time being, then placed a camera roughly where we want the final render to be taken from.



03 Refine the terrain Make the terrain a bit more interesting with Blender's sculpting tools and Dynamic Topology. Jump into Edit mode and trim away most of the useless areas that won't be seen in the final render. Then switch to Sculpt mode and enable Dynamic Topology. This feature enables you to sculpt and have your mesh dynamically tessellated under your brush strokes. Used the Grab, Clay and Crease brushes to define some sharper peaks and valleys. You should add some additional roughness to the landscape and flatten out the site for the castle a little.



Dynamic Topology sculpting

Blender's Dynamic Topology tool is fantastic for sculpting forms quickly when you don't quite know how you want your final model to look. You can grab and stretch your mesh in all sorts of ways without worrying about topology, or add as much detail as you like without subdividing manually. Use the Detail Size setting to control how finely your mesh will be subdivided under your brush strokes. Set the Refine Method to Subdivide Collapse for rough work, which will collapse details into rougher topology if you use a larger brush, or to Subdivide only for working with details.

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Learn how to

- Create a procedural landscape in Blender
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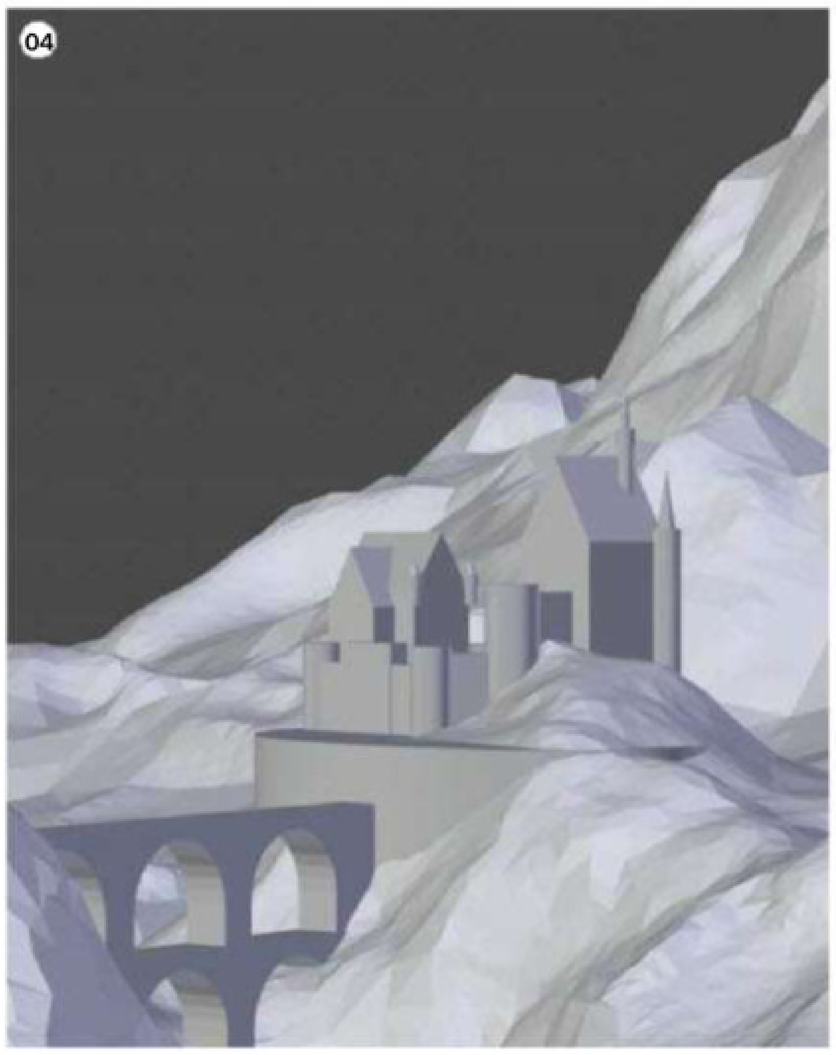
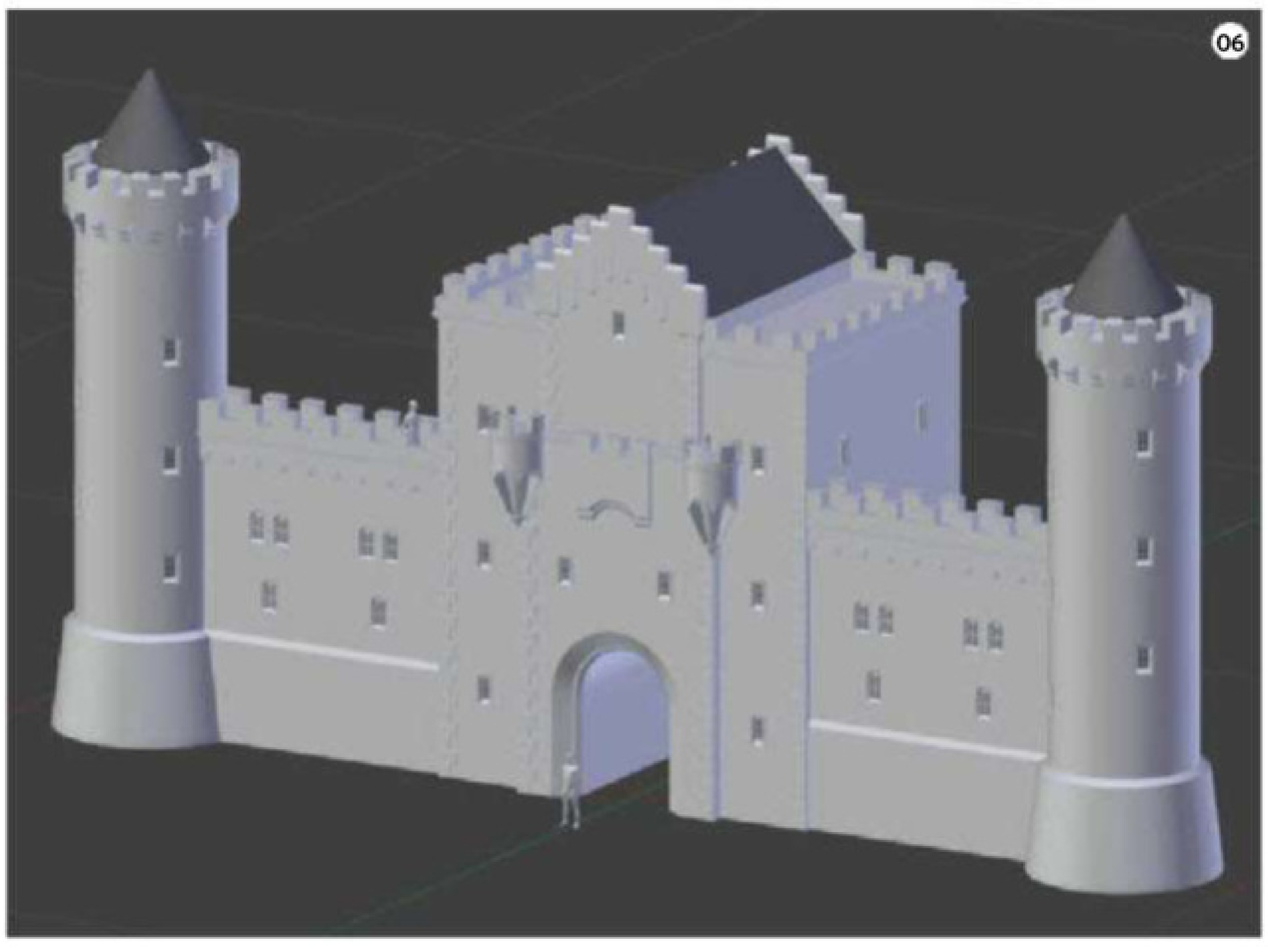
- Use particle systems to generate a forest

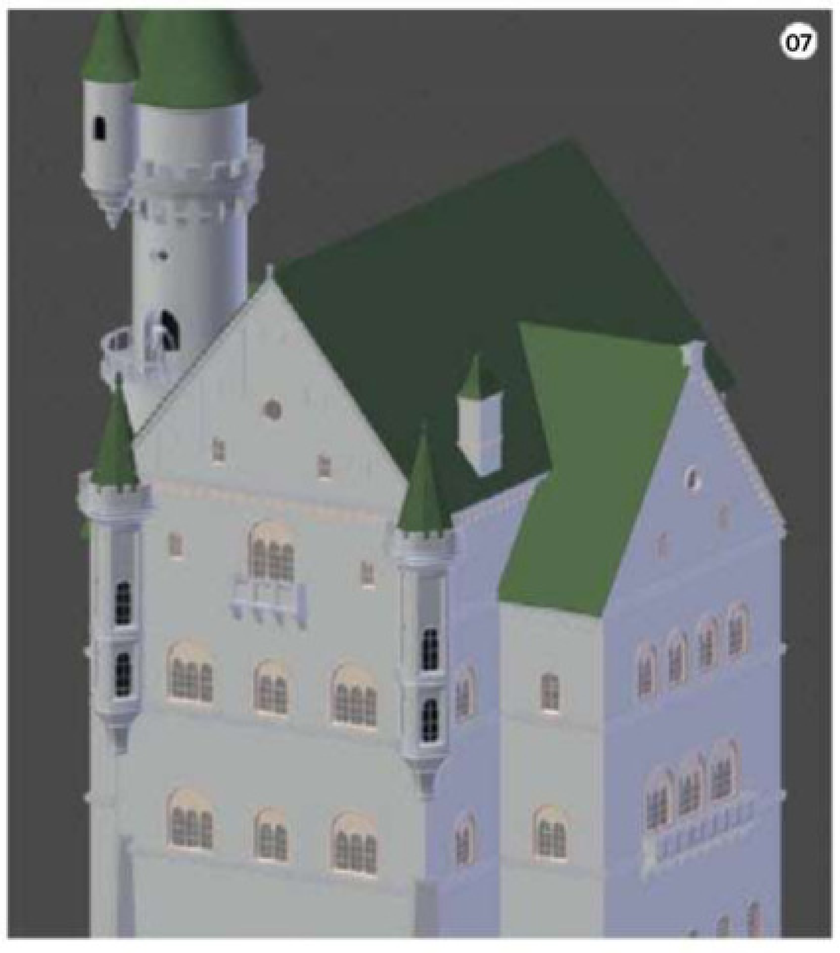


04 Block in with Primitives To start off the castle, use very rough shapes just to plan what parts the castle will have. Add and scale cubes and cylinders for the towers and use cubes with the top face pulled upwards to make a peak for the main buildings. Play around with a few different configurations of shapes, adding bridges, extra towers and the like, while moving them around to see how they look from the camera's perspective in order to find a layout you like.

05 Get an early render Maybe it's good planning or maybe it's just time wasting and vanity, but I like to get an early render to see how my scene looks. The Cycles render preview (Shift+Z in the 3D Viewport, set your render engine to Cycles) is great for this. Add a basic Sun lamp to the scene and basic Sky to the World Settings (Blender's Sky Texture node is great for quick outdoor lighting), and experiment with a couple of angles for the Sun, seeing how it affects the shadows falling on the castle.



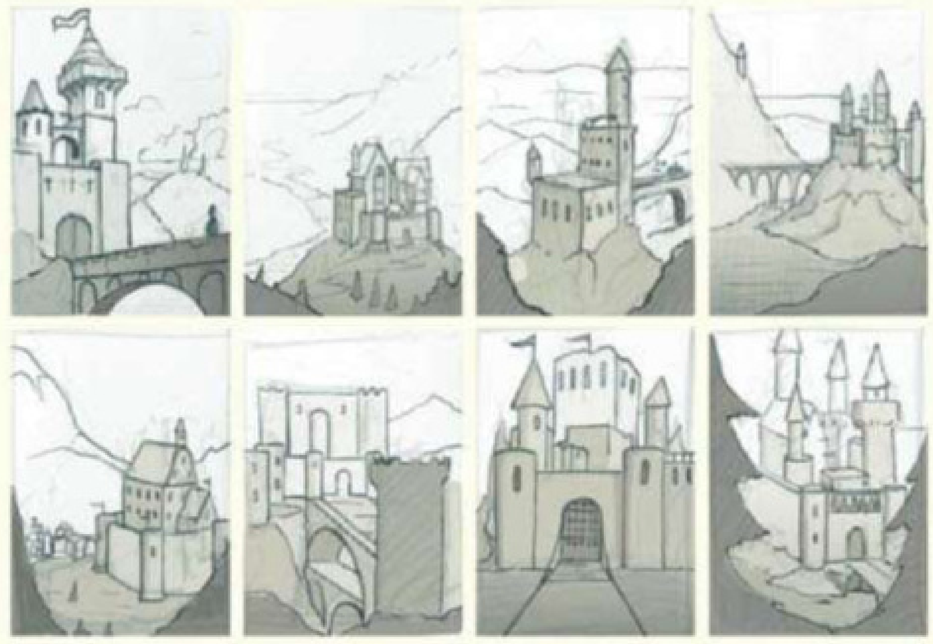
06 Break up the castle To make working on the castle easier, break up its design into chunks, with one for the front wall and gatehouse, another two for the two main buildings, and another for the foundations and the bridge. Duplicate these chunks and place them on their own layers. Next, group (Cmd/Ctrl+G) all the objects in each chunk into their own group. This enables us to rebuild the original block-in of the castle using instances of each group (go to Add>Group Instance>[Your Group] to add an instance). This lets us update the contents of each group, while working on them separately. Additionally this lets us work on the different groups in a more user-friendly, axis-aligned orientation.



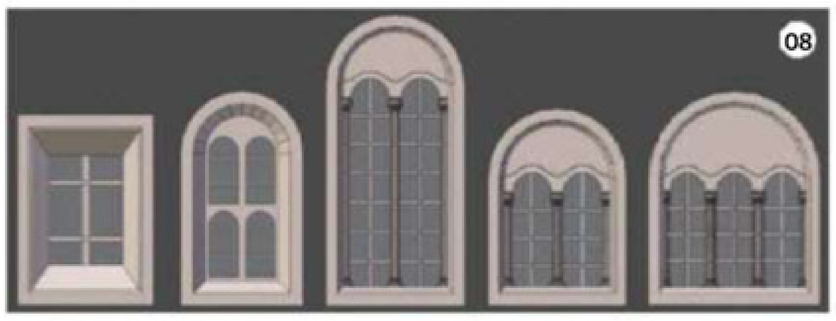
07 Detail the architecture Using the blocked-in geometry of the different chunks of the castle as a guide, begin creating more detailed models of the castle. For each large section of a building or wall, begin by creating a more detailed model of the overall structure, just by extruding and adding cuts to the original block-in geometry. Next, set about including secondary elements, such as windows, doors, crenellations along the walls and other architectural details.

Concept

Before starting, I searched online for some inspiration and sketched a few rough thumbnails of castles to see how I wanted my final image to look. I didn't use any of these thumbnails specifically, but they helped me to narrow down the focus of my final design and make choices about the scene's composition.

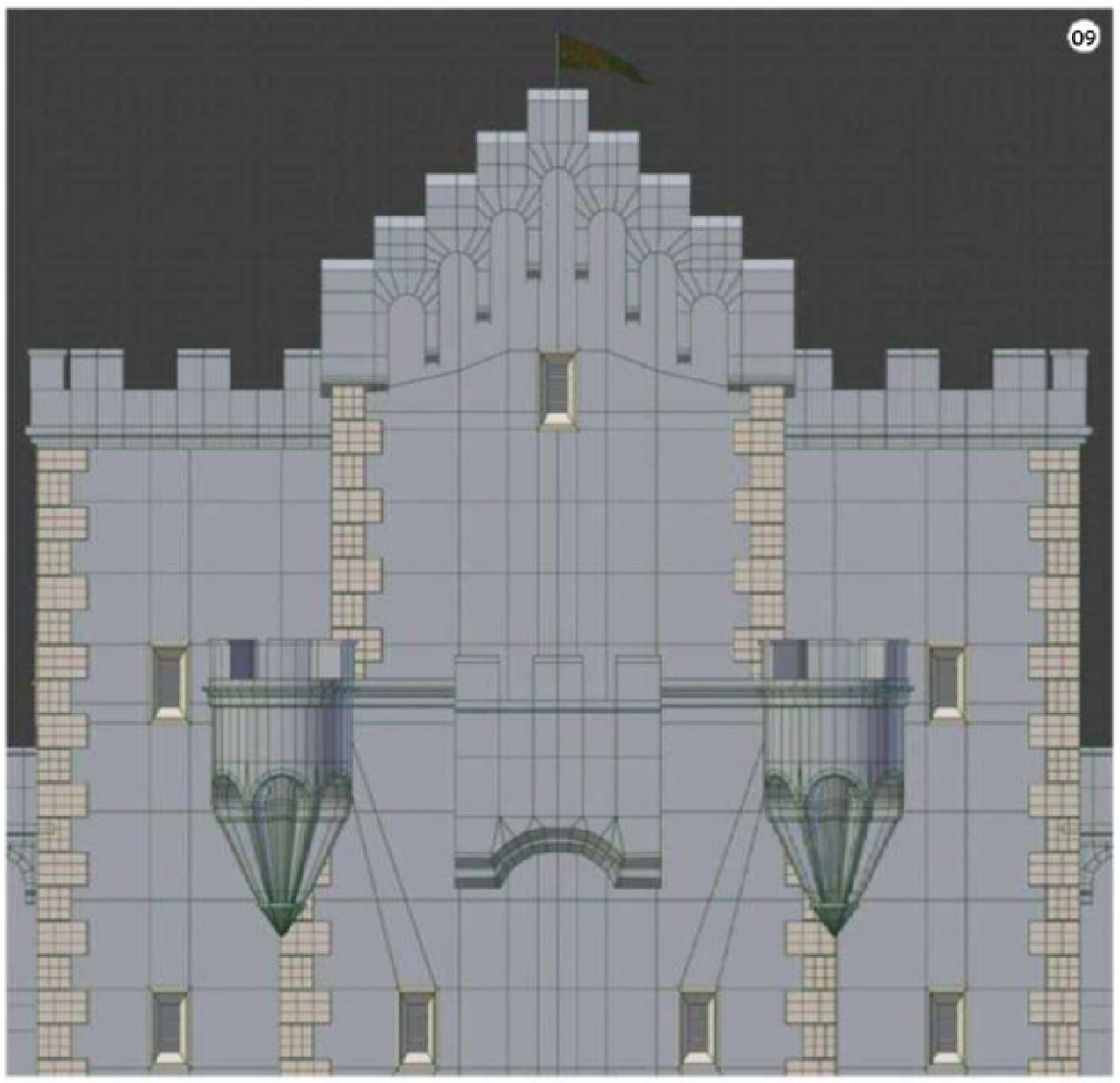


08 Work with duplicates While the overall structure of the castle is pretty unique from piece to piece, there are a lot of repeating elements in the design of the castle overall. Especially for the windows, we only need to create a few different designs, which we then duplicate and place around the castle. By using linked duplicates, we can keep every instance of each window type sharing the same mesh data. Not only does this make altering windows easier (as any changes are reflected in every window), but it also helps enormously when UV unwrapping and texturing the castle, as objects that share mesh data similarly share texture space, and only need unwrapping once per design.

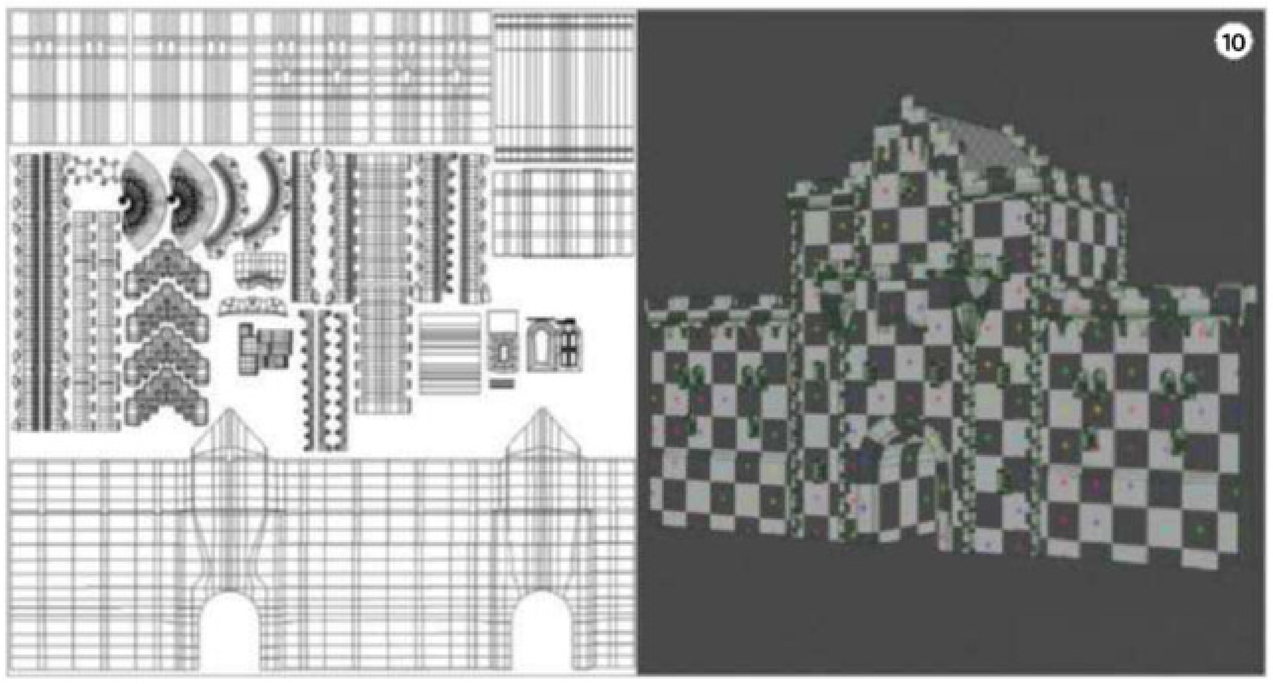


Array Modifier tricks

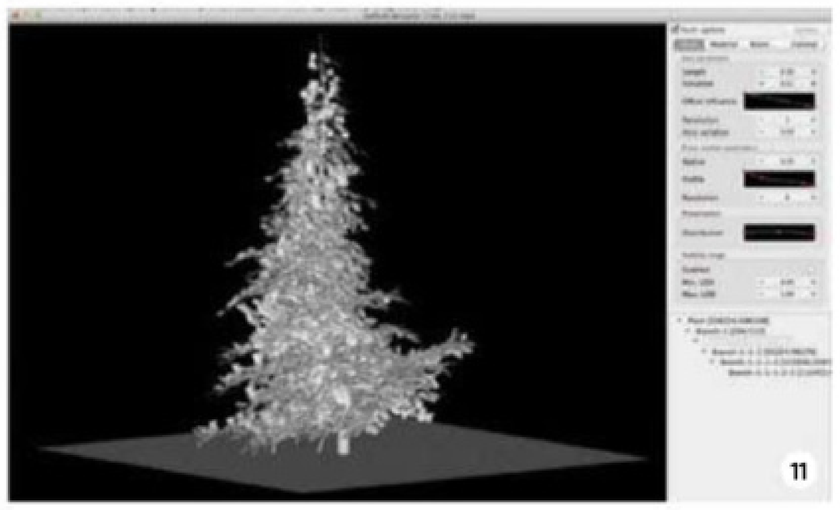
The Array Modifier is a great tool for working with designs that have repeating elements. It comes with several different inputs for specifying how you want to duplicate geometry. The Relative Offset setting is best for duplicating repeating blocks of a design, and you can use the Merge settings to automatically merge vertices between repeats. The Object Offset can be used for more complex designs, as it lets you use the transforms of an Empty to specify the offset for repeats. This lets you rotate and even scale the repeated elements. I used the object offset as an alternative way of adding repeating designs around circular towers, by placing an Empty at the centre of the tower, and using it as the Offset Input for an Array Modifier. I could then rotate the Empty to specify the angle between repeats, and change the count setting of the modifier to set how many repeats I wanted around the tower.



09 Add crenellations and towers Most of the walls and roofs of the castle are embellished with crenellations. To create these, model a single section of the design, and then use Blender's Array Modifier to copy the design many times in the desired axis. Most of the time we can then apply the Array Modifier and fit the model to the forms of the walls and roofs – going round corners and curves and leaving gaps for towers and windows. For the round towers, use the Warp Operator in Edit mode to wrap the linear design around a cylindrical form. By snapping the 3D cursor to the centre of the tower and placing the un-deformed crenellations at the correct radius from the centre, the Warp Operator takes the X-axis of the geometry and wraps it around a circle.



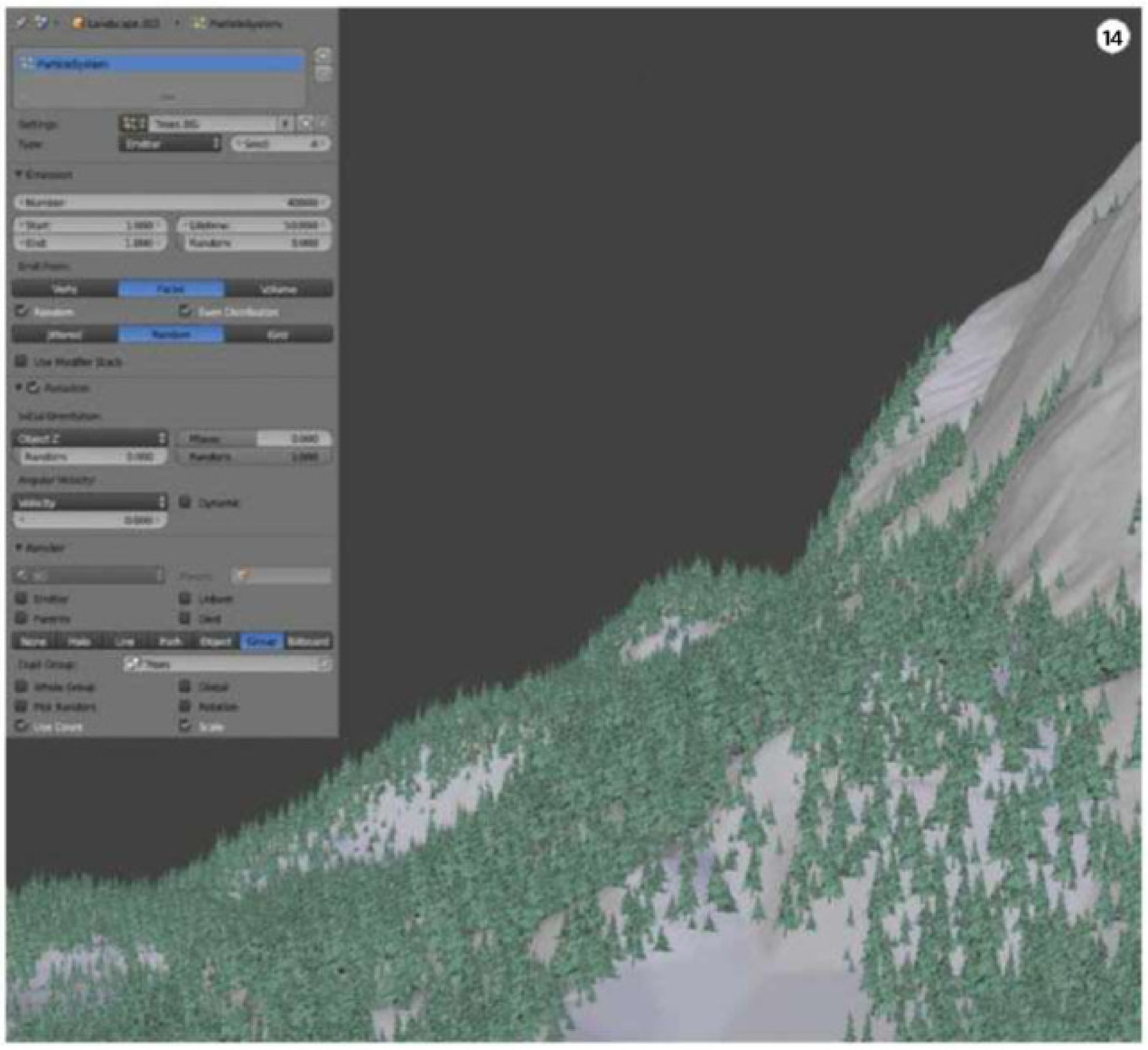
10 UV Unwrapping Unwrapping models is always a pretty tedious task, but Blender has some pretty useful unwrapping tools. For each chunk of the castle, we should try to pack every part of the model into a shared UV space. Unwrapping the larger, flatter areas of the castle is easy – just use the basic Unwrap Operator, or sometimes the Project From View Operator for large, flat areas. For more complex areas like the crenellations, select flat areas first and unwrap them (the Select Co-planar Operator is great for this – press Shift+G in Edit mode with a face selected), then pin those vertices' UV coordinates, add seams to the model and then unwrap the surrounding areas to get a passable unwrap for the more complex areas. As soon as the task of unwrapping the models is done, we can move onto other, more creative aspects!



11 Add trees with ngPlant ngPlant (**www.ngplant.sourceforge.net**) is an open-source plant-modelling application that lets you create plants by starting with a trunk mesh, to which you can add branches upon branches until you want to add leaves on the end. To make our trees, start with a relatively tall trunk, then add a few levels of branches. In my experience, tweaking the controls for the Branch Density, Axis Variation and Declination (the angle that branches point up or down based on how far up the parent branch they are) has the greatest influence on what kind of tree your result resembles. For the fir leaves, I didn't add a mesh for every needle – instead my final level of geometry on my tree was a wings mesh that added flanges down the side of the branch they belonged to.

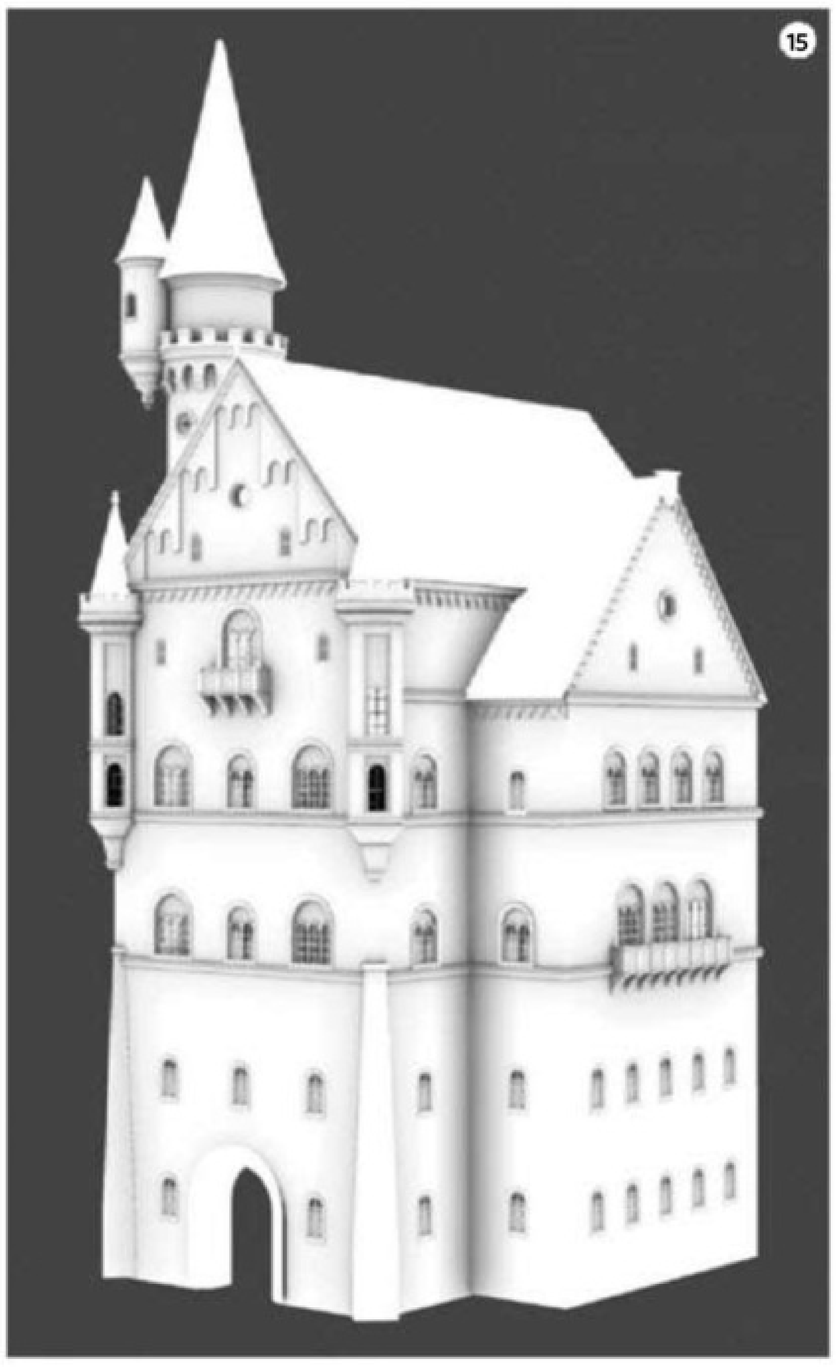
12 Export the trees The other great feature of ngPlant is that you can easily create variations on a single tree design. The parameters for tree creation feature several random factors, such as Axis Variation (bending along the length of branches) and the Rotation Angle between different branches, the results of which are governed by a Seed property (found under the General settings for the tree). By cycling through Seeds, you can achieve a wide range of different trees with the same overall features, but that are subtly different. Let's export a few of these variations (with some manual tweaks such as overall Height) into OBJ files that we can later import into Blender.

13 Set materials for the trees The materials for our trees are pretty simple to accomplish, and entirely procedural. NgPlant does a good job of automatically generating UVs for your generated trees and exporting them with separate material groups for each branch or leaf level. For all the branches, simply apply a brown Diffuse material. For the needles, take the UV co-ordinates of the long leaf meshes that run along each of the branches and manipulate them with nodes to give a gradient out from the middle of the branches to the edge, and use this as the overall Alpha of the material (by controlling the Mix Factor between a Diffuse and a Transparent Shader node). Multiply this Alpha factor with a procedural Wave texture that breaks the appearance of the wings mesh up into individual needles. Although the final tree won't stand up to close scrutiny, in a forest of thousands it looks the part.



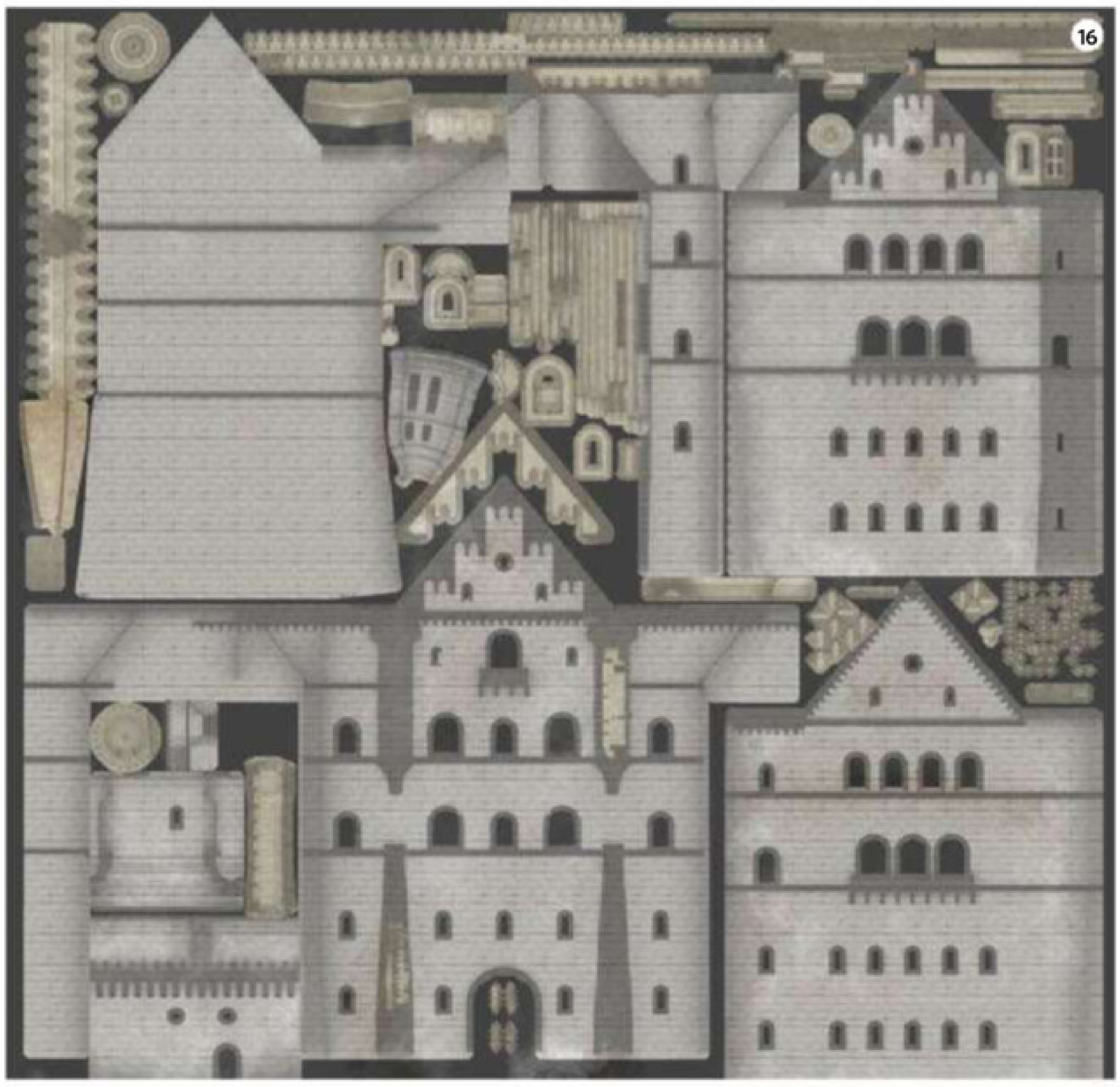
Use the Sapling plug-in

An alternative to ngPlant is Blender's Sapling add-on. This tool works in a very similar way to ngPlant. It also has a number of procedural parameters for generating trees, and it has some nice tools for affecting the overall shape of a tree (as well as some presets for common shapes). It can even automatically create a rig for your tree to enable it to animate and sway. However, its options for leaves are much more limited and there is less control over each level of branching, so I stuck with ngPlant for my trees.

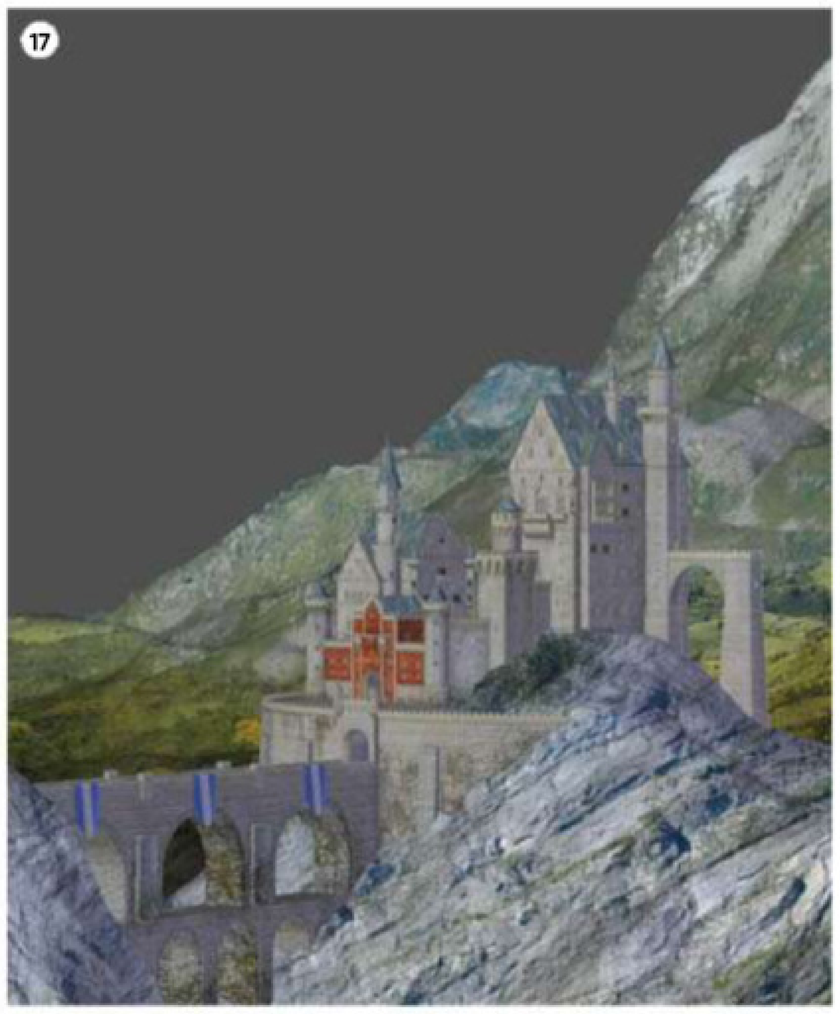


14 Create a forest To make a forest out of trees, use a particles system. Add a new particle system to our landscape with several-thousands of particles, all emitted on the first frame. Then group all trees together and set the Render mode of the particle systems to Group, and set the Trees group as the source. This populates the landscape with thousands of trees. Add some randomness to them with the Size set to Random, and by randomising their Rotation slightly. We can also use the Particle Info material node to convert the individual particle trees indices into a slightly randomised green hue for the needles' Diffuse colour. This will give every tree a slightly different appearance and will make the forest look less homogenous.

15 Bake textures for the castle Returning to the castle, we have already unwrapped each chunk to a texture sheet, so switch render engine to Blender Internal temporarily (Cycles has only started supporting texture baking in the latest dev builds, so I stuck with BI) and bake out a few maps. For each chunk of the castle, bake an Ambient Occlusion map, as well as a few different seamless brick and concrete textures. As well as this, bake out a Groups map for each chunk of the castle, assigning different colours to areas we want to paint with different materials. This makes selecting different areas easier for texture painting and masking textures.



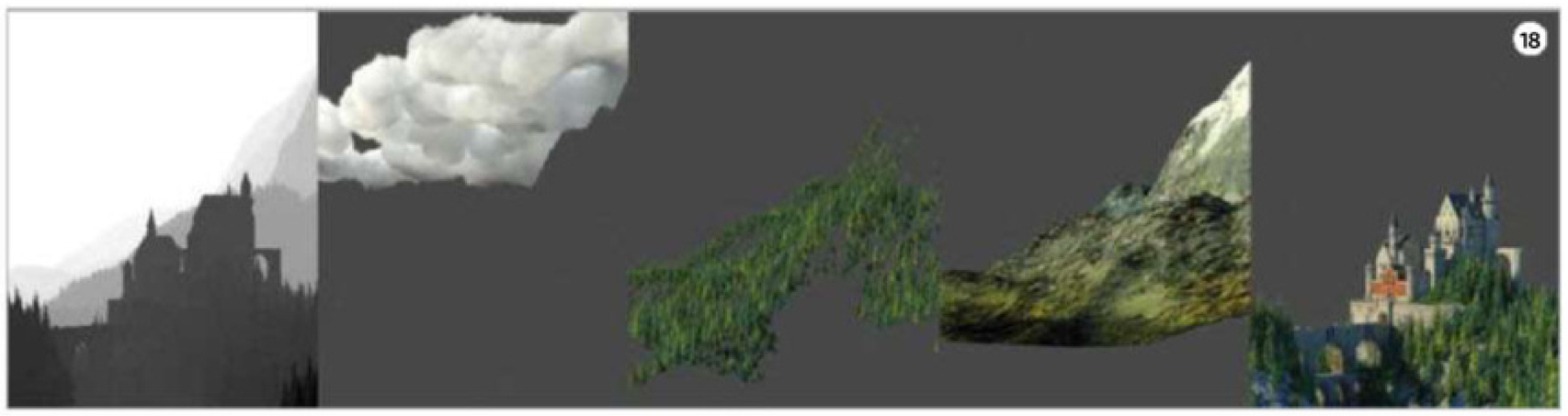
16 Combine texture baking and painting In Photoshop, combine the baked maps, using the group's map to mask different areas of the texture with different base textures (different kinds of brick or concrete). Next, multiply this with the AO map on a low Opacity to add some basic grunge, then paint in some further variation and cloning in grunge from other sources. The result for each part of the castle should be a nicely aged texture with a consistent brick pattern that doesn't look too repetitive overall.



17 Texture the landscape For the landscape, take a slightly matte-painted approach, creating the landscape texture from the camera perspective to save time. Grab images of mountains, grassy hills, and rocky cliffs from texture websites, and use different bits of each to cover the landscape, blending them together by adjusting their colours manually and cloning parts together. Create two separate textures for the foreground and background of the landscape. You don't need to worry too much about large areas of texture looking entirely plausible, as most of the landscape is going to be dominated by the forest in any case.

Create clouds

We want to add clouds to the sky, which can be done using Blender's Cloud Generator plug-in, as well as some painting thrown in when compositing the final image. In a separate scene within the blendfile (into which we linked our landscape objects and camera), loosely model streaky clouds, then convert them to clouds with the Cloud Generator tool. This add-on turns a mesh into a cloud object with a pre-configured material for rendering in Blender Internal. Render the clouds as a separate pass that we can eventually composite into the final image. For my image, it didn't look amazing as just a basic render pass, so I did a fair bit of messing about with it in Photoshop later on.



18 Render passes For the final render, split the scene into a few different passes, with one for the foreground of the scene (including the castle itself), another for the background landscape and a third for the background trees as a separate layer. It's also worth rendering out some clouds and a simple Z-Depth pass that we can use to add some aerial perspective to the scene.

19 Composite the final image Using Photoshop, we'll composite the final image. Layer in the different render passes and combine them with gradients, a slight vignette and some colour grading to create a final image that you're happy with. Try painting in the odd wisp of cloud or erasing the occasional stray tree by hand. You could also add a slight bloom effect by creating a merged copy of the layers, blurring it and tweaking its Levels before adding it back onto the scene to create softer lighting in the scene.

• **DID YOU KNOW?** • All tutorial files can be downloaded from: **filesilo.co.uk/3dartist-74**

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Model, texture and render an old German classroom

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Personal portfolio site www.vi-3d.de

Country Germany

Software used Cinema 4D, V-Ray, Photoshop

Expertise Stefan specialises in the lighting of 3D scenes and rendering interiors

> Take a lesson in how to model, texture and render an old-school classroom in Cinema 4D

Stefan Haberkorn runs a company creating animations and visualisations for customers including Volkswagen, a local TV station and Bilfinger Berger

This tutorial illustrates my workflow in reconstructing my old classroom from primary school, created in Cinema 4D R13, V-Ray and Photoshop. The key things we'll look at is how to achieve a dense atmosphere through illumination and during post-production.

As with every project, the first step is to find reference images to look at when you eventually start with the modelling process. Once we're well-acquainted with the look we're aiming for, we will start modelling the interior and furniture. We will also consider where and how to arrange the furniture in the room to scatter light for the most dramatic effect. Next we'll go through the properties of the V-Ray camera and how to position it for good results. After all of this, I'll introduce the relevant features of V-ray materials. Last of all, we'll set up for rendering and lighting.

As a rule, I tend to do a lot of work in post-production, so I will go through how I like to blend separate passes together in image-editing software.

Learn how to

- Model with NURBS
- Texture with V-Ray materials
- Add light in V-Ray for C4D
- Render with multipasses
- Include post-production

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Tutorial files:

- Tutorial screenshots

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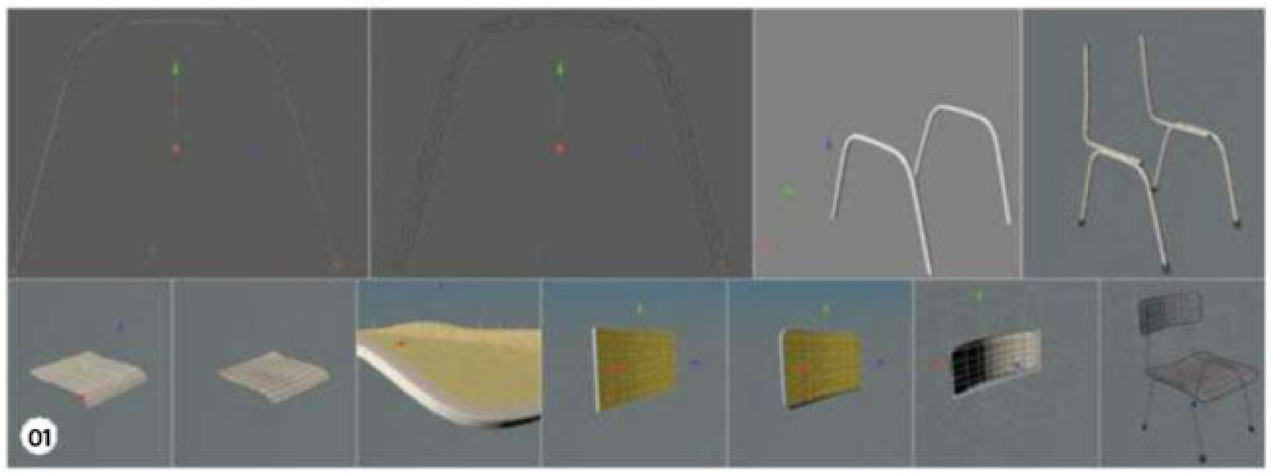
Concept

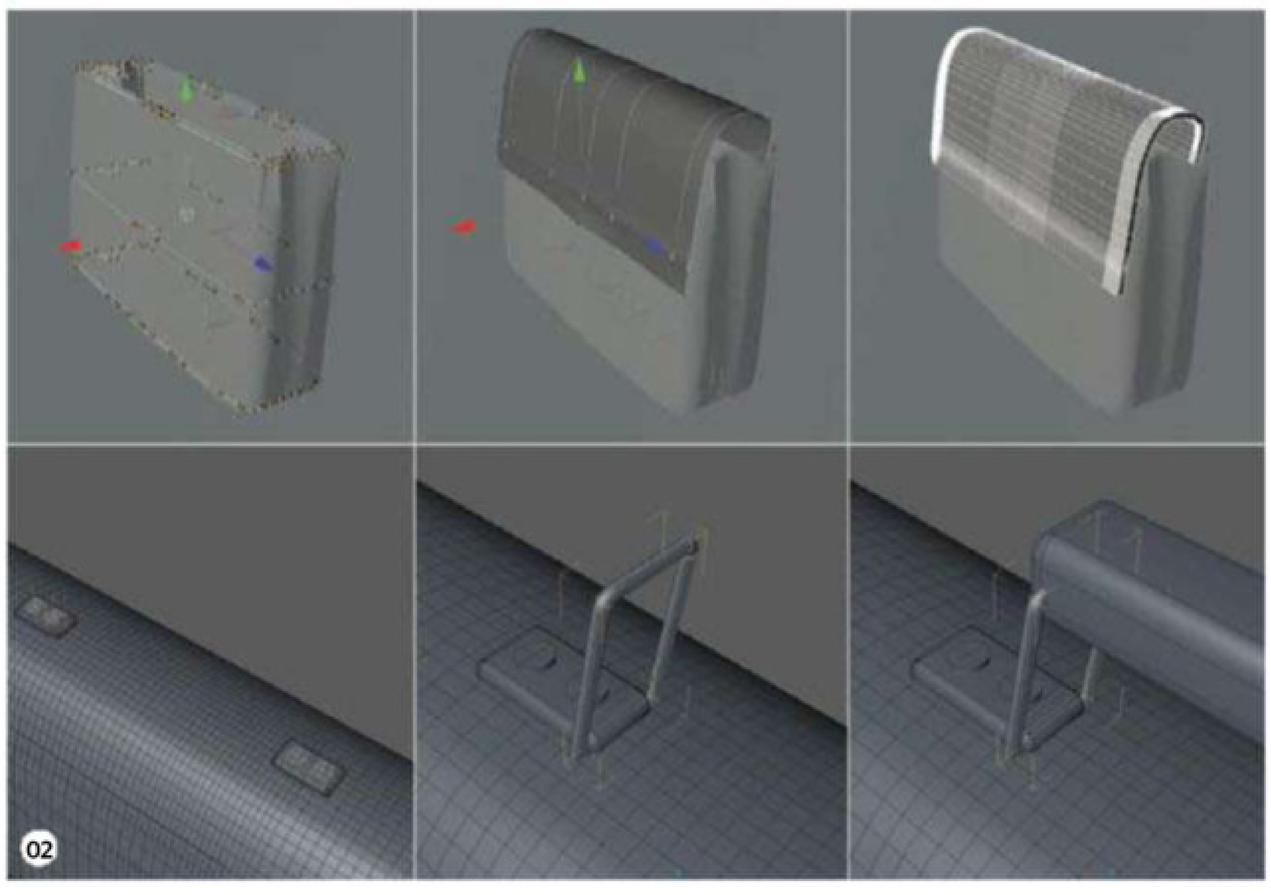
I usually find that any picture always starts with a feeling. My aim is not necessarily to just present an image, but to create a sense of nostalgia that is tangible to the viewer. In this case, I wanted to play upon that warm feeling that I tend to get when I think about the old classroom that I used to study in when I was at school.

The studio ● Model, texture and render an old German classroom

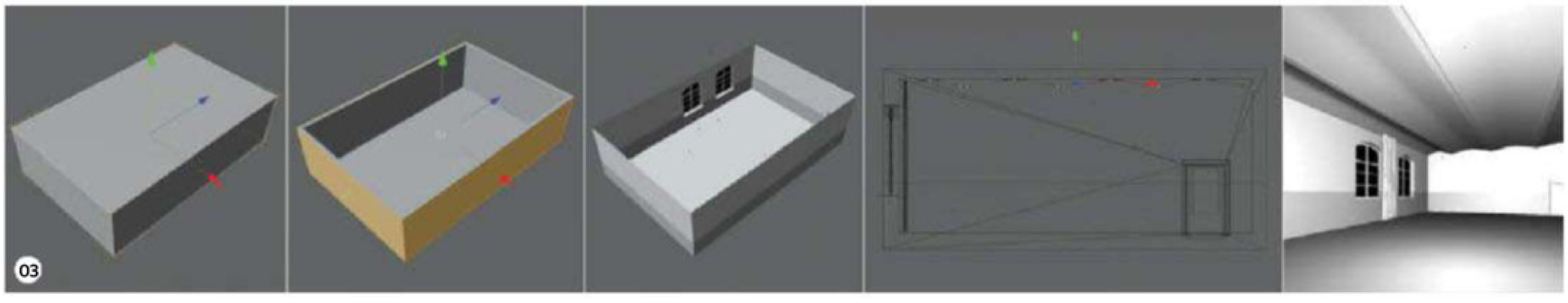
01 Use NURBS to model a chair First of all, let's define the splines for the shapes and paths of the metal pipes. We will need to generate the geometry using sweep NURBS. To create the second half of the chair, use a Symmetry Object. When it comes to building other metal objects, this is a good method to use. To define the rough shape of the backrest and seat, move the vertex of a Bezier NURB until the curved shape is roughly finished. After this, we can round off the corners with a HyperNURB. Once this is done, convert the NURB geometry into polygons. To add volume to your geometry, apply an Extrude modifier. The typical bending of the wood surface should be done with an FDD deformer.



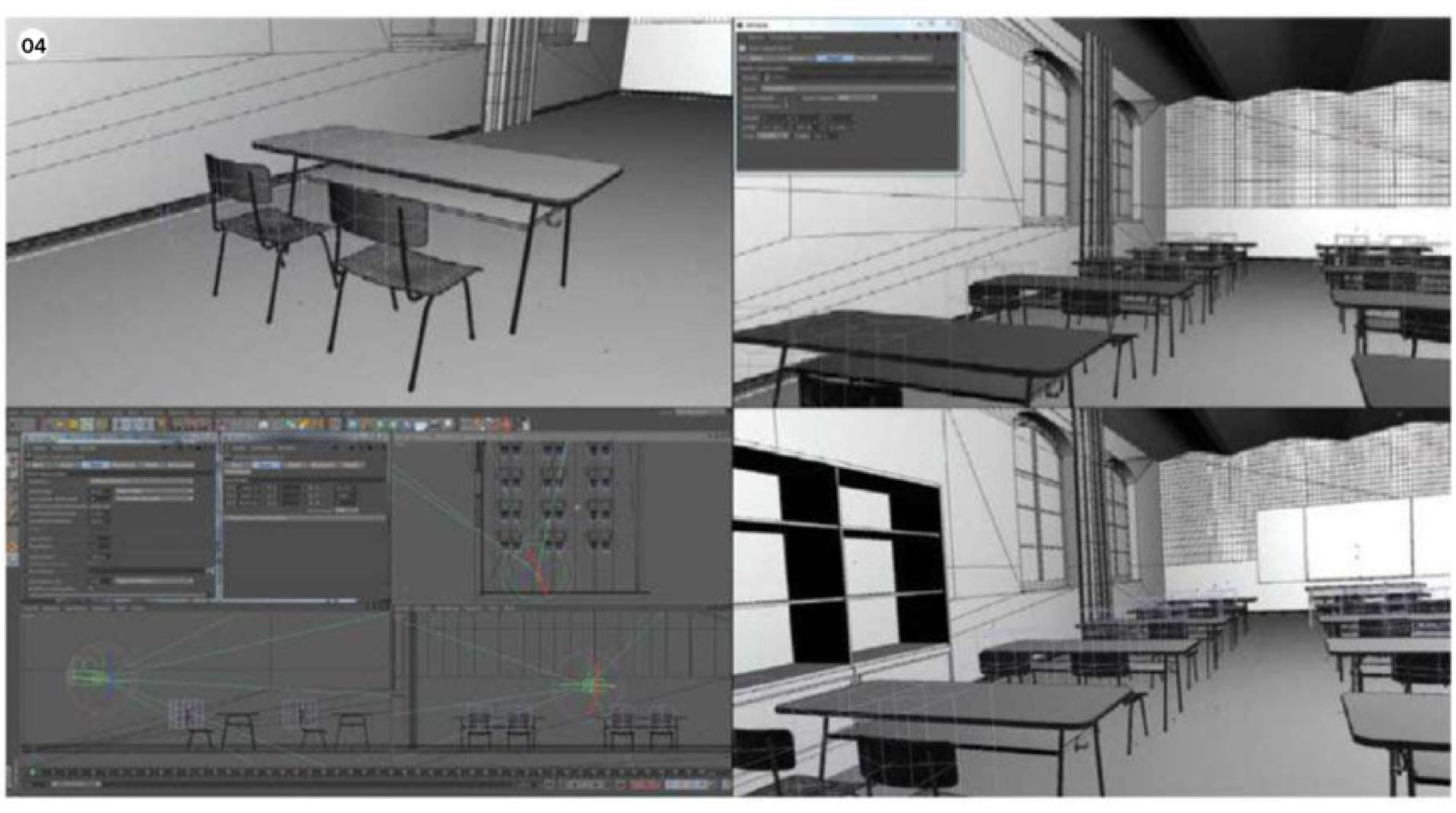
02 Model with NURBS For the base body of the satchel, we'll be using splines and Loft NURBS. By moving the vertex, we will manage to achieve the wrinkles and creases of the leather. This time we'll be simulating the thickness with a C-NURB Extrude. For the handle and the clasps, model them with basic body cubes and Sweep NURBS. Since these parts are only going to be very small in the final image, don't worry about detailing them too much.

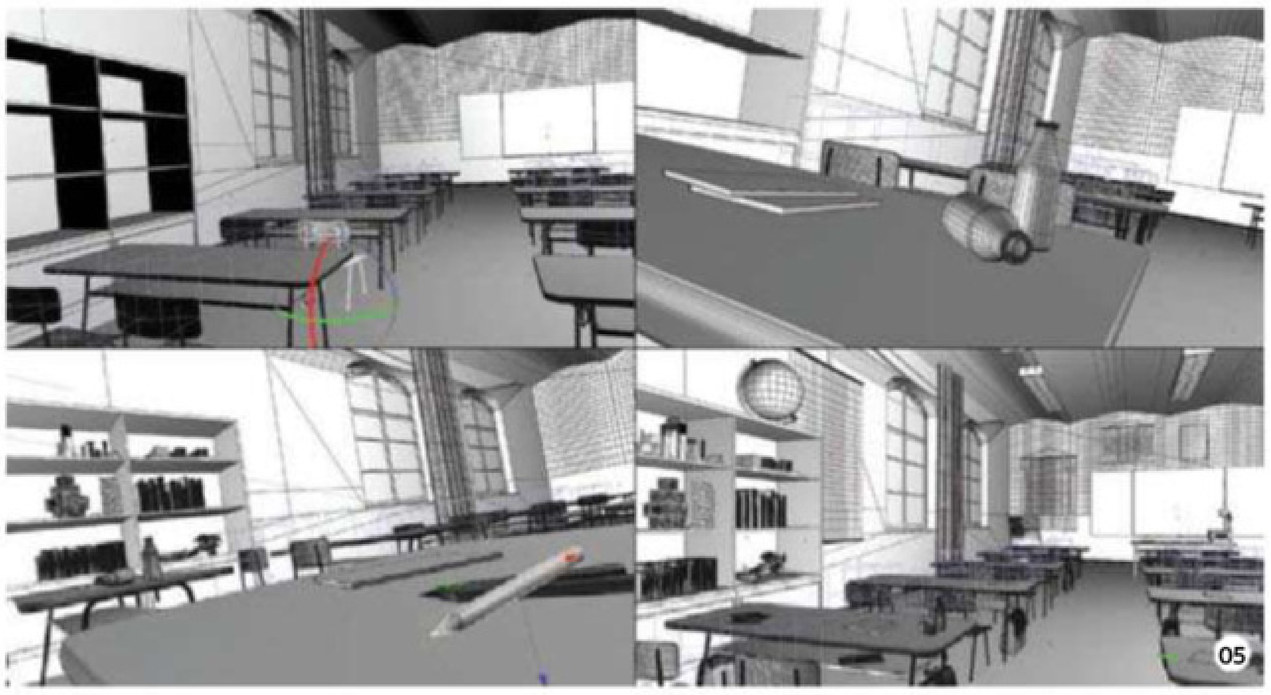


03 Build the room To build the classroom, start off with a box with both the top and bottom surfaces detached. This provides the walls, ceiling and floor surfaces. To add volume to these elements, use the Extrude modifier. In order to create openings for windows in the walls, cut into the walls with Boolean Operations. The parts of the windows that have been removed then need to be processed into glass panels and frames via poly modelling. For the ceiling, create beams with simple cuboid shapes. The round-shaped segments are again done via splines and NURBS.



04 Place the furniture and camera First, two chairs are to be placed next to the table. After grouping them (linking to a Null object), instances can be generated from it and distributed via MoGraph Cloner Objects. In the Cloner Object, the grid mode should be activated. The result is a very clean arrangement, which serves as a basis for camera positioning. In my scene, I have the focal length set to 26.8 degrees, as this is equal to a relatively natural distortion according to the human eye. By tilting the camera you get the sense of a random snapshot.



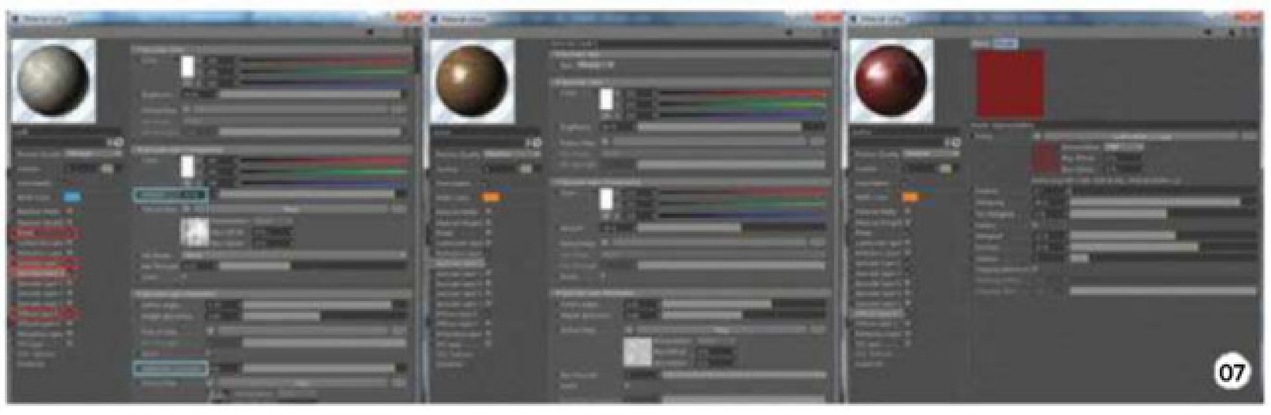


05 Place the accessories When all the major furniture pieces are set, the finished objects should look a little messy and cluttered to make it seem less sterile and posed. At this stage we can add the smaller props, such as rulers, books, bottles and staplers. It makes sense to do the positioning from different angles to fake a look of comfortable disarray. This way you can re-create that inevitable clutter of a school classroom.

06 Illuminate the scene A Point light outside the windows is set to simulate the rough light distribution in the scene. This is very important to get the settings for the texture properties and to get a first impression of the overall atmosphere. At the positions where light hits the furniture directly, fewer objects should be placed, so that the shadow edges remain clear and sharp.

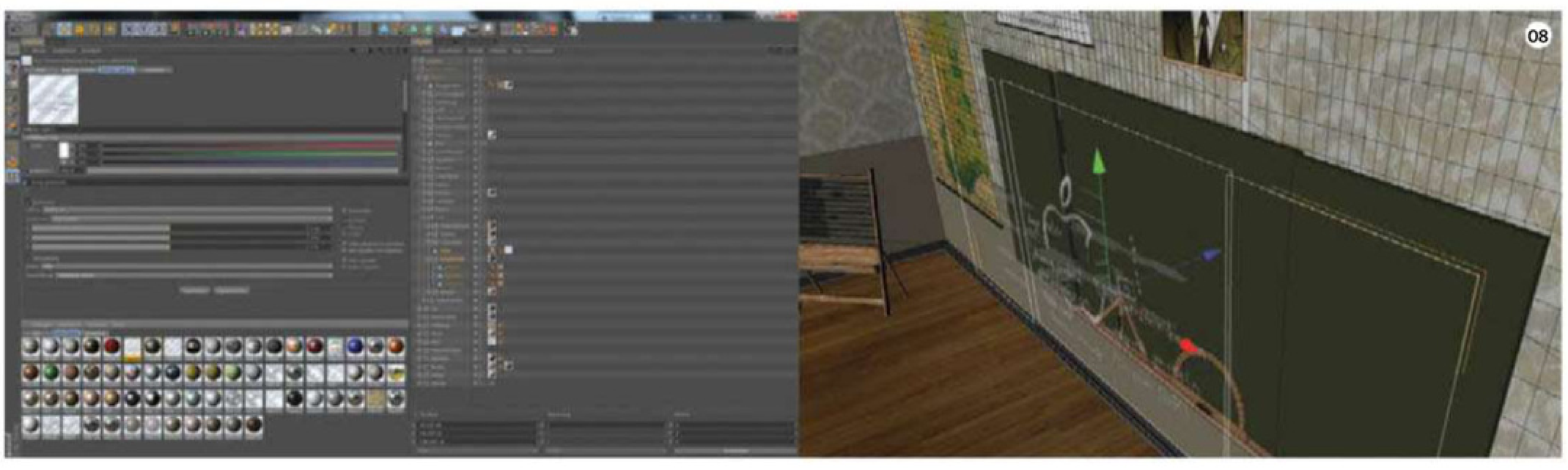
Model with polygons

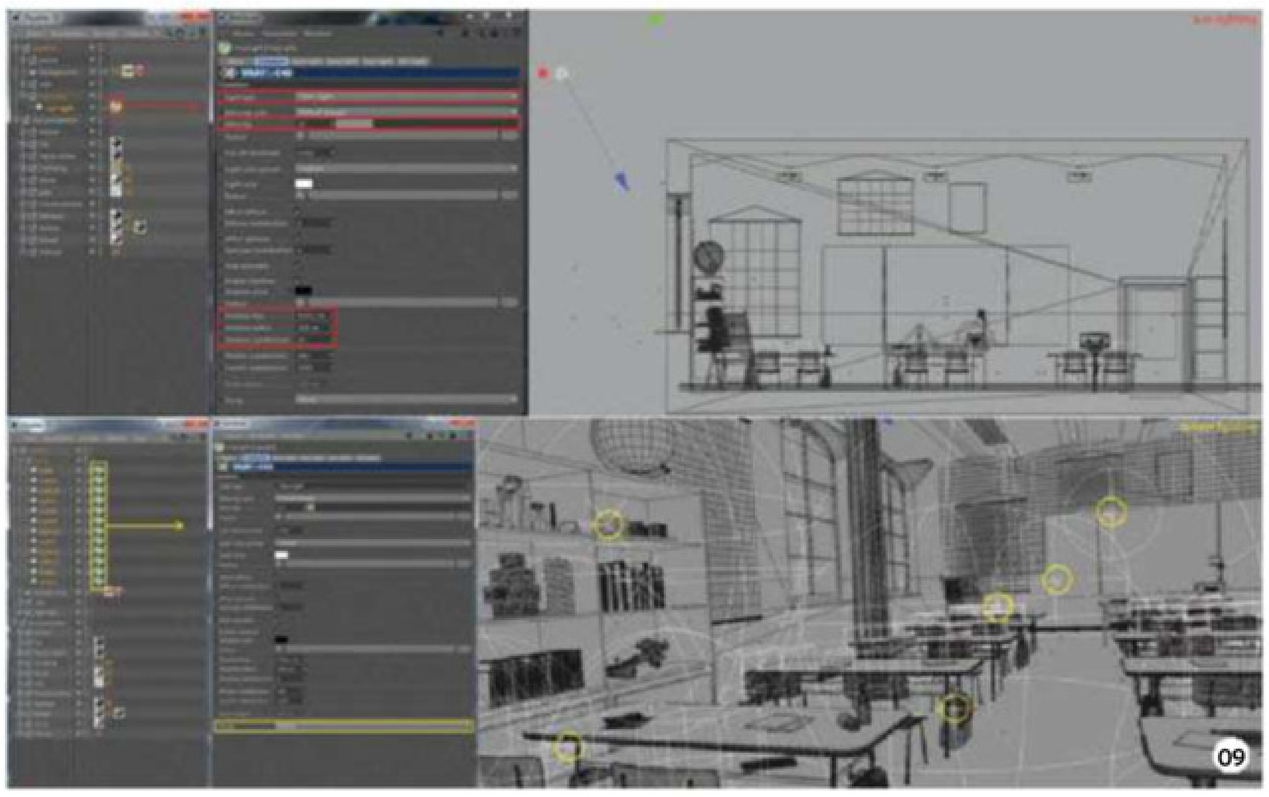
Another way to model furniture in Cinema 4D is polygon modelling based on blueprints. For this, use cubes or spheres to form surfaces via Extrusion and inside-Extrusion to generate geometry based on drawings or photos. Organic forms can be generated with HyperNURBS. For simple rounding, select the edges of an object and divide it with a Bevel. The division of the concave bevels should be set to at least 5. With this workflow I often had the problem of low subdivisions. My advice is to bevel each edge, as there are no hard edges in nature.



07 Texture with V-Ray materials When it comes to texturing the scene, search for suitable textures in both your personal collection and on online texture libraries to collect all the textures needed for the scene. If possible, stick to procedural shaders, especially with Dirt maps and maps for non-uniform reflection. The reflection is one of the most important properties for good lighting that creates atmosphere. In V-Ray materials, there are four properties that are needed in most cases: Bump, Specular layer1 , layer2 and Specular Diffuse layer1 . In Specular layer1, highlights are defined. It is set to be quite diffused and weak so that it ensures the emphasis on the form. In Specular layer2, trace reflections are set. You can now lower the intensity of Reflection, Glossiness and Specular layer transparency to add Diffuse reflection. Each material should be edited depending on its Reflection properties. For example, the wallpaper should have a very low-reflection Glossiness, in contrast to the table surfaces that need a relatively high setting. It is important to realise that the appearance of light is mainly created by the materials, rather than by the actual lighting.

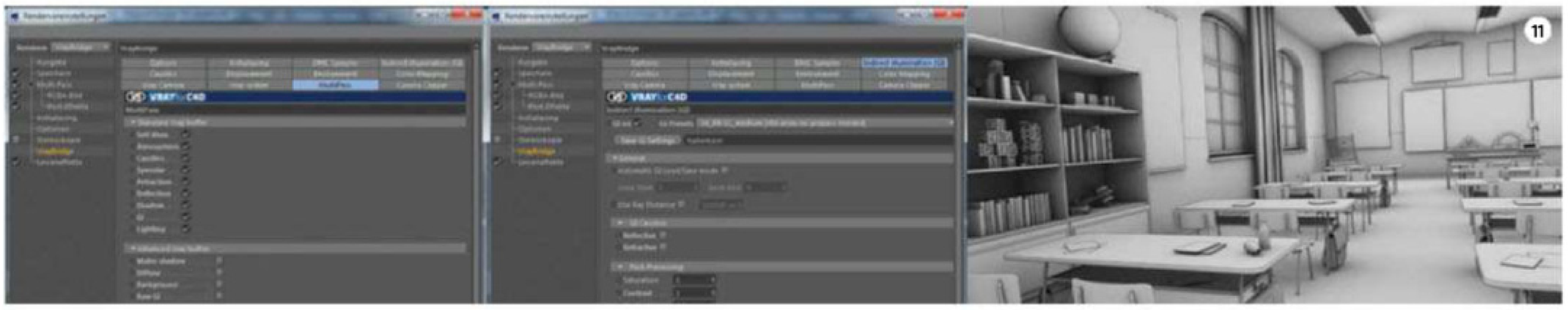
08 Layer the materials In the case of the blackboard surface, we can use layered materials for the metal texture and for the chalk strokes. As in many other 3D programs, V-Ray does not offer the option to layer several materials above one another, but thankfully in the standard Cinema 4D setup, materials are much more flexible. For my scene, I developed a slightly fussy yet simple method in which you have a second-level object with an Alpha map, then the chalk set to 1mm distance on top of the blackboard. To avoid unwanted shadows or AO, you have to create a V-Ray compositing tag in the Object Manager behind the layer that excludes the appropriate properties.





09 Finalise the lighting The incoming sunlight is simulated with a Point light and a V-Ray light tag. I don't usually work with physical lights, as V-Ray for C4D doesn't allow multipass in its Physical mode. The light source must be set to Omni Light in V-Ray. In the Common field, the Intensity should be set to a high value of 20. Set the Shadow Bias to 0.051 with a Shadow Radius of 500cm to provide a realistic soft shadow inside the room. The Shadow Subdivisions should be set to 16 to avoid any pixelated shadows. To brighten up certain areas that are rendered too dark, place small Point lights with an Inverse Decay. This ensures that the light source affects only a certain radius, so the scene isn't overexposed by too many light sources.

10 Create coloured ID images To calculate a pass for Material IDs, each V-Ray material has to be assigned a specific colour. The Material ID pass is a multicoloured image, which will be handy for selecting different objects in Photoshop. When assigning the colours, use pure RGB colours, then move onto using tinted colours. If you need even more colours, change the brightness as well. Define groups of materials, such as glass, metal and wood objects and assign the same colour for each member of the group. This is a worthwhile effort, as using similar colours for similar objects means that it's easier to define which material is which later on.



Physical rendering

Another method to render the illumination of a room is by physically calculating the light. To do this, the Infinite light type should be chosen in the V-Ray Daylight settings under the Common tab. After this, the options for Physical Rendering under the Sunlight tab need to be made active. In this way, it's possible to simulate a very realistic lighting of the room with a CIE sky model. In this case, the camera requires a V-Ray Physical Camera tag, which can be created in the Object Manager. Here, the strength of the vignette is regulated and the ISO value for the camera is set. With this method, it's unnecessary to change the brightness of the Sun, since it's better tuned with the ISO and Shutter Speed control.

11 Render settings and multipasses The render settings are set in V-Ray under Indirect Illumination. Caustics aren't needed, so tick off these two boxes. The Primary Bounces must be set to a high setting, such as 2.2, with GI engine set to Irradiance Map. Set the Secondary Bounces to 0.94 and the GI Engine to Light Cache. Ambient Occlusion can be left at its default values. Since V-Ray can't render an AO pass, create a new render preset with standard C4D AO settings. With this workaround we can render the AO pass anyway. To get all the layers of an image, tick all boxes under Multipass in V-Ray's settings. From the Advanced settings we need the raw reflection and raw refraction. Any effects must be added to the RGB image in the Multipass tab.

12 Post-production In Photoshop, the different layers have to be arranged in a certain way. Set the GI pass to Linear Dodge, while all other layers must remain at the default values. The Raw Reflection pass is copied and duplicated. To avoid overexposure, create masks using the multicoloured image so that we can specify exactly which locations need reflections. Do the same with the Specular pass. The Shadow pass can be turned off, as it's only really affecting the shadows at this point. After this point, the AO layer will need to be inserted into the scene and set to Multiply with a tweaked Opacity. Last of all, add in any final details to really bring your classroom to life, such as cracks in the wall.

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Marvelous Designer
Chris Gillett
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Residing in Los Angeles, Chris specialises in character modelling and texturing for games. Check out his tutorial for using Marvelous Designer while sculpting on p76.

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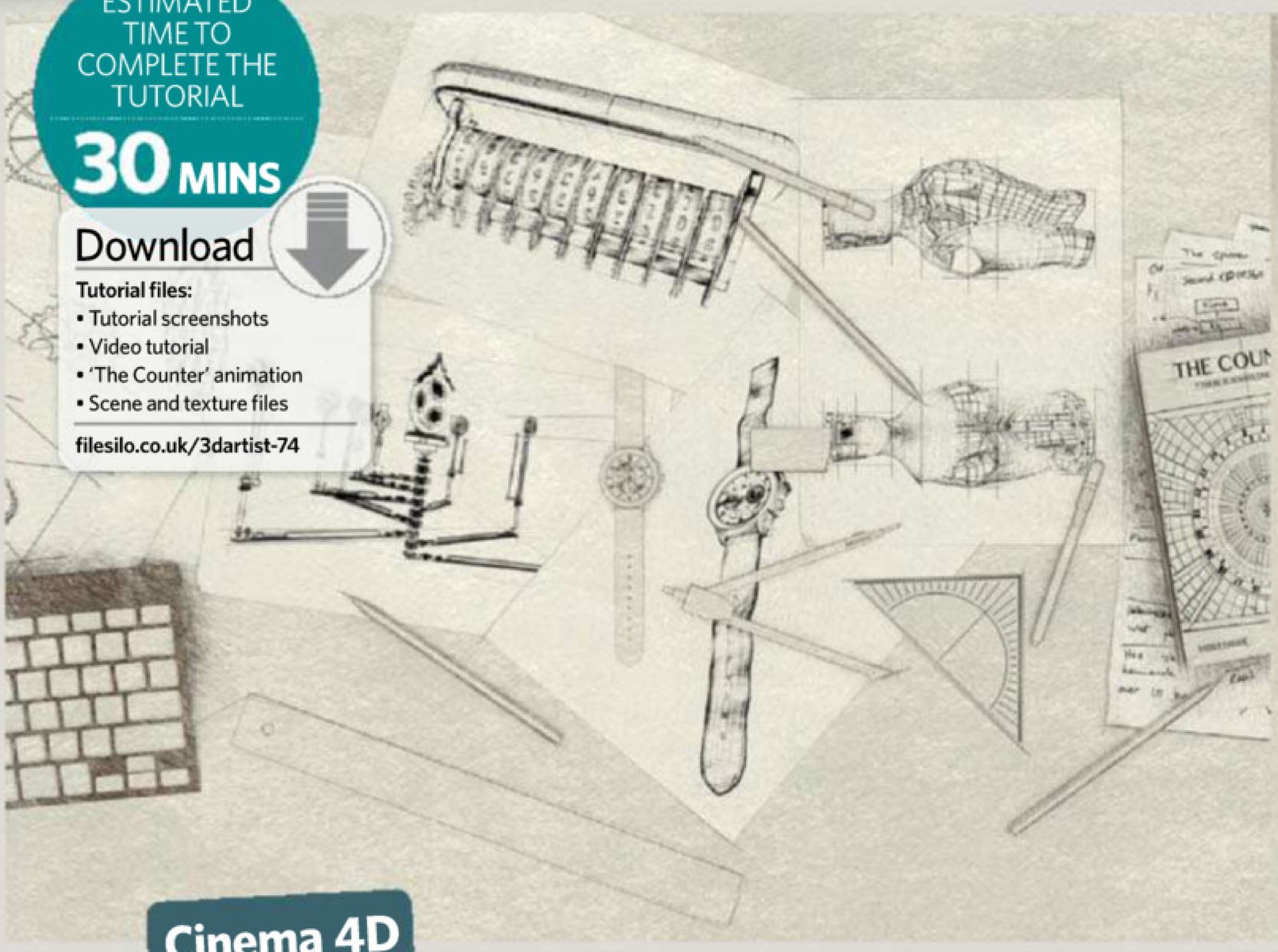

Cinema 4D

Hand-drawn style animation

"How can I make a 3D animation look as if it's been drawn by hand, using Maxon's Cinema 4D?"

The Sketch And Toon function in Cinema 4D enables you to give your 3D animations a simple, but incredibly complex-looking hand-drawn or painted look. The fun thing about this tool is that it will enable you to create your own signature style, helping you to become the kind of artist that you've always wanted to be. In this tutorial we will take a look at the basic workflow of this powerful tool. Over the next few steps you will learn to create Sketch materials, and how to set up a very simple scene.

01 Lay out the scene

Open the start scene files that can be downloaded to accompany the tutorial. Create a Null object and rename it as Stage. Add an Omni light and move it to the centre of the scene. Once it's there, increase its Intensity up to 110%.

The next step is to create a Sky object, then select both the Sky object and the light source, dragging them both into the Stage (our Null object). Once you've done this, create a new material, turning off its Specular, then change its name to Sky Material. Go to the Color channel and click on the arrow in front of the texture, hovering your cursor over Effects until you can choose Ambient Occlusion. Once you've opened the Ambient Occlusion settings, change its Accuracy value to 100% and Maximum Samples to 100.

NUKE

Paul Champion
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Paul is a 3D and VFX demonstrator on undergraduate and postgraduate courses at Bournemouth University's National Centre of Computer Animation (NCCA).

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02 Set up the render

The next stage of the tutorial is to open up the Render dialog box in Cinema 4D. Here, ensure that you add Sketch And Toon to your renderer. Under the Lines tab, turn on Outline and Intersection, then change the Hidden Cull to Hierachy. For the last part of this step, go to the Render tab and choose Normal for Line AA Option. Now you should be able to close your Render Settings box and continue with the animation.

03 Add the sketch lines

This is definitely the most important part of the tutorial, as now we will be defining the sketch lines for Cinema 4D. Let's create a new Sketch material by going to the Material section. Once there, click on Create, hover you cursor over Shader and select Sketch Material. Apply the material you have just created to the object of your scene. Double-click on this material and open the Material Editor. Rename this material to Sketch Lines or Drawing Lines. In the next step we are going to adjust several of the settings of this material, including the Stroke, Adjustment, Distort, Color, Thickness, Opacity and Clone.

04 Define the drawing lines

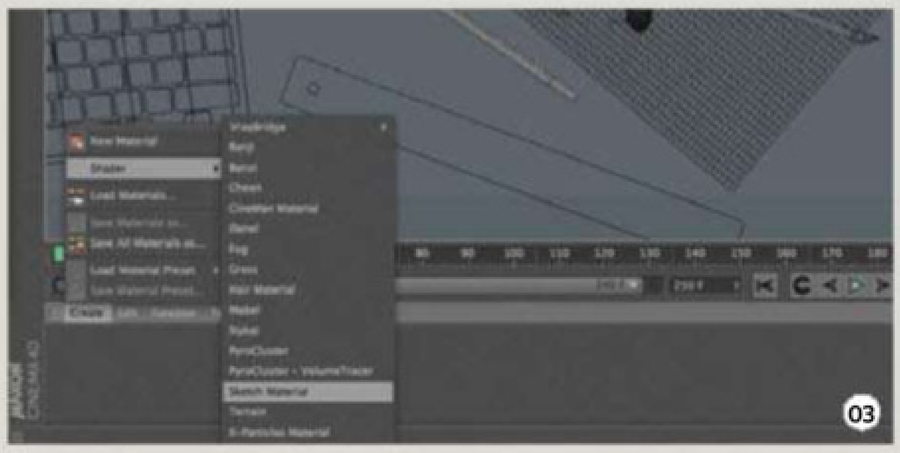
The Stroke option will define the line surrounding your scene objects. Press Enable under Stroke, change Match type to Flat, change the Join Limit value to 50%, and Join type to Miter with a Limit value of 40. Under the Adjustment channel, turn on Relative under Overshoot option, use 3% for both Start and End values and use 50% for their variations. Distort will give the sketch lines a more natural look by distorting them. Turn on Curve Stroke and change its type to Akima, set the Step value to 5 and Strength to 14%. Change the Mode to Sin and use 5 as the Displace value. The Color channel will define your pencil or brush stroke colour, so opt for any colour of your choice, while thickness represents the density of your drawing lines. Turn on Along Stroke and change its mode to Spline. The Opacity channel will influence the transparency of your drawing lines. Let's say you want your artwork to look more like water paint – this option will help you achieve that. Last of all, the Clone channel will automatically clone more sketch lines around your objects, but be very careful with this option if you want to save yourself some render time.

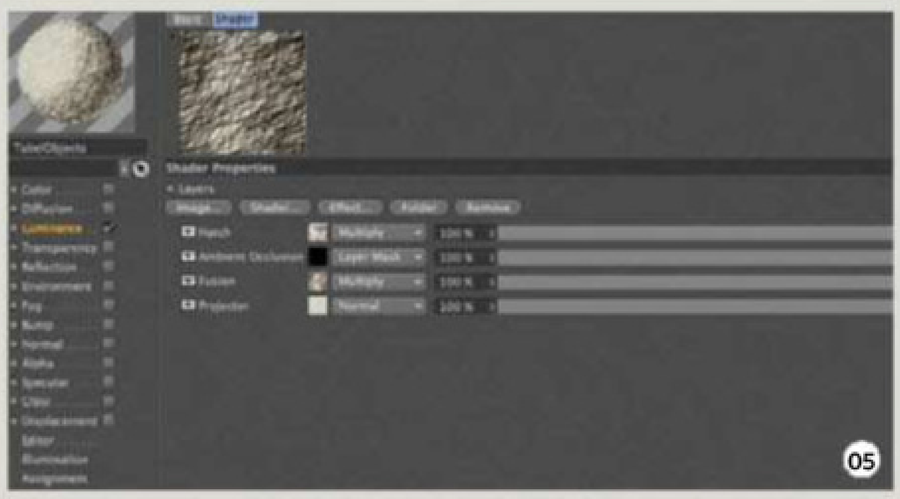
05 Create a Hatch material

Create a new material and turn off Color and Specular. Turn on Luminance, then go to the Luminance channel and add Layer to the Texture channel. Open this channel and start adding a Hatch Material (Shader> Sketch>Hatch), a Fusion channel and a Projector (Shader>Effects>Projector). Copy the Ambient Occlusion channel from the Sky material and paste it underneath Hatch. Next, click on Ambient Occlusion and reverse its colour order from black to white, to white to black. Go back to the Layer channel and change the order to Hatch (Multiply), Ambient Occlusion (Layer Mask), Fusion (Multiply), Projector (Normal). Open the Projector channel's settings and load PaperTexture.jpg onto Texture, with the Projection mode set to Frontal.

06 Finalise the hatch

Go back to the Layer channel, click on Hatch, load Brush.jpg onto the Texture channel (that represents your pencil) and adjust its values. Under the Color tab you can define your brush colour. Go back to the Layer channel, copy the Hatch material you just created and paste it into the Blend channel and Base channel of the Fusion layer. Set the Fusion mode to Multiply and at 85%. Go to each one of these new Hatch materials, and under the Illumination tab, turn on the Light and Shadow option in both channels. Close the Material Editor and apply the materials to your scene objects.





Create Sketch materials

As one of the download files, you'll see that a final C4D file is included. Explore this file in your own time, playing with the settings to see the kind of looks you can achieve. Experiment with the Sketch And Toon tool to create your own signature look. You'll also find an accompanying video guide to help you.

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Import Marvelous Designer files into ZBrush

How can someone use Marvelous Designer in a sculpting workflow?

The strength of Marvelous Designer tends to lie in its ability to create near-photorealistic cloth simulation, and it can potentially save a lot of time and tedious effort if you learn to use it effectively. There are plenty of tutorials available online that explain how to use the software in a successful way for realistic creations.

As a program it can get you almost all the way there, but more often than not you will need to refine the mesh to suit your specific needs. This is where our tutorial comes in! There's not a lot of information about how to make something into an asset that you can edit after leaving Marvelous Designer.

For me, Marvelous Designer serves as a great base, but I tend to think of it as more of the first pass rather than a final result. As a game artist, there are some modifications and tweaks I'll need to do before the asset is ready for baking to a low-res mesh.

In this tutorial I'll share my method for getting Marvelous objects into ZBrush and ready for the next round. Through these steps, you'll learn to generate a clean, sculptable mesh while maintaining nearly all the detail from the original. You can use this technique for most kinds of clothing.

One of the nice things about this method is that you'll be able to have your mesh separated at the seam lines. This allows for a greater flexibility for showing overlap like a garment would traditionally do. Additionally, depending on the complexity and detail of the asset, it provides the option to break the meshes out individually to help manage polycount and allow for a smoother and much quicker workflow.

01 Import to ZBrush

Once your first round of Marvelous Designer gear is ready, proceed to export your OBJ and import it into ZBrush. The first thing we want to do is turn on Double, then Auto-Group our mesh by UVs. Double enables us to see the back side of our currently single-sided mesh. Marvelous Designer's pattern layout is great for getting a clean set of UVs in the right areas that we can use to our advantage. Auto-Group by UV references this and creates PolyGroups corresponding to them. Note that they perfectly define our desired seam lines.

02 Add thickness

For sculpting pretty much anything, especially cloth, I like to have geometry with thickness to work with. One of the big reasons is the way ZBrush handles single-sided geometry and its edges, as meshes with added thickness are much more responsive, predictable and easier to work with. Panel Loops serve as a great way to utilise our clean PolyGroups to create this thickness on our mesh. Invert the Elevation to -100 so that it inflates inward, leaving the outer detail untouched. Adjust the thickness to suit the type of material you are emulating. Meshes that are too thin can end up giving you a headache by presenting problems like sculpting through to the back, or the back poking through to the front. This is another reason to make sure that the Double option is switched on. We want to be aware of any weird, difficult sculpting issues before it's too late.

03 Adjust the folds

The thickness will bleed through the mesh in certain areas depending on how high you set the value and how intense the folds were from your Marvelous mesh. A simple Smooth job will help push the mesh back down. The Panel Loops functionality also creates new PolyGroups for the thickness we added. We can use this to mask the outside and vice versa to push and pull the inner and outer faces back into a proper position. Use the Move Topological brush to readjust the edges after. The fact that we have separate pieces of geometry makes it easy to utilise this brush and get the feeling of overlap very effectively. We also save a lot of resolution in the mesh this way, as opposed to sculpting the seams on a singular piece of geometry.

04 Use ZRemesher

ZRemesher is a great addition to ZBrush, making the process of generating new, better working topology without interruption better than ever. Personally, I like the freedom of having the lowest resolution base-level geometry as possible. This enables a series of large changes on broad scale. I particularly like to use the Move brush as well as the Smooth tool at low-subdivision levels to ensure the softness in my adjustments. From my experience and observation, cloth is all about subtlety. Marvelous Designer does a great job of this, so it's important to maintain as much of that as we can. In this case, I duplicated the mesh, left the settings at default and hit ZRemesh. The result is great in that it conforms to some of the major folds, aiding that geometry without having to subdivide to extremely high levels.

02

03

04

05

05 Reproject details

Once the new mesh is created, we need to reproject the detail back. Use the Project functionality as you subdivide your model. I like to start from the lowest subdivision and as I add new subdivisions, I continually reproject the detail. This enables the mesh to slowly conform to the highest level of detail in a more gradual way. Experiment with Projection Distance in order to retain the detail as much as possible. At the end, in some cases, a simple smoothing will help to tidy it all up.

06 Polish the mesh

We've now got the mesh in a workable state, with subdivisions inside of ZBrush. I went ahead and continued to sculpt some more detail and refine the mesh. As mentioned in the introduction, Marvelous Designer does a great job at simulating reality, but sometimes we need more than that. Designing the specific flow and folds within a garment is something that usually requires that personal touch within ZBrush. At this point, we are in a place with plenty of flexibility and we have successfully managed to retain a lot of the original detail from Marvelous Designer. Where you take your mesh now is up to you!

06

Workflow side notes

When in Marvelous Designer, I like to reference real-world sewing patterns for different types of garments. If you adhere to these instructions, the chances of having a realistic piece of clothing are high. Working with Marvelous Designer as much as I have has given me a different kind of appreciation and understanding of clothing, and having a mesh from Marvelous Designer can be a great learning tool. Because its results are very accurate, we can use it as a point of reference for understanding cloth better. It's a universally applicable idea to note. Understanding the person or thing you are attempting to re-create in 3D is the first and most important step to succeeding at any task.

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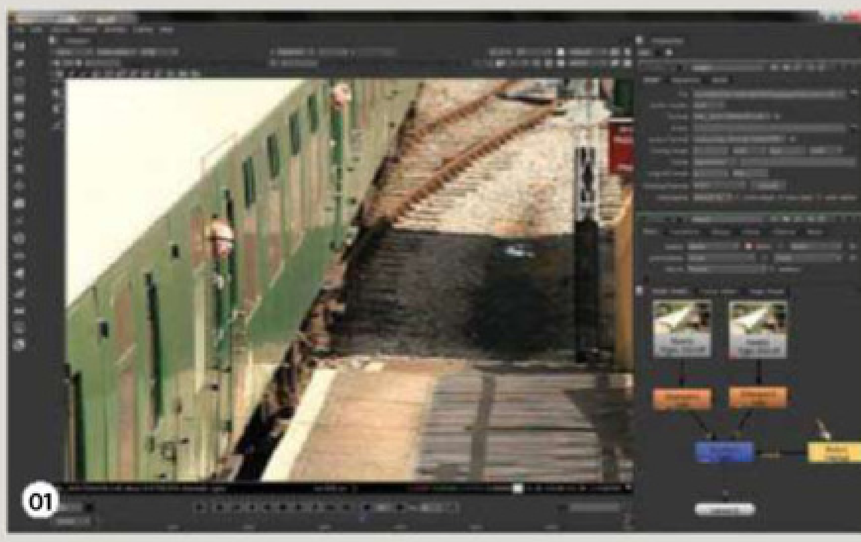
NUKE

Hide objects in motion

"How can I remove a moving object from footage, even when it's changing in scale?"



Object removal is a common practice in post-production. Movie blooper reels and television shows remind us of the gaffs that have slipped by production and hit our screens, such as the infamous car in the *Lord Of The Rings* theatrical release, which was removed for DVD and Blu-Ray sales, a crew member on his mobile phone in *Pirates Of The Caribbean* – sometimes publicity stills fall victim too, such as the water bottle on a mantelpiece in a shoot for TV period drama *Downton Abbey*.

When removing an object, something has to take its place, and while there are a few techniques to do this using NUKE, the problem becomes compounded if it's a longer shot, and when the object moves towards camera to become very prominent. Tools like the Rotopaint Clone brush and accompanying Rotopaint tools are effective for simpler shots in which the object remains small throughout, and for cloning areas around an object that can be repurposed to replace it. A patch made by cleaning up a frame, which is then composited with tracking over an object, is suitable for panning shots where the target object to be removed tends to remain around the same distance from camera. However, for more complex shots where the object scales and moves towards camera, these techniques can prove to be a bit of a headache.

In this tutorial we'll look at removing a person leaning out of a moving train window as the train moves towards the camera. We will use NUKE's Keymix Node, which takes two images and layers them together according to a Mask input, which is a drawn Roto shape. It can be used to lay a background over a foreground within the keyer, which is what we will do. We'll use this technique to extract a section of the train carriage near the person – using a Time Offset node and Translate Node we'll reposition the section over the person to be removed.

The advantage of this workflow is that we'll be repurposing original footage, and therefore retain reflections and other details that would be harder to mimic using the Rotopaint node and patches, particularly in situations where the object to be removed is moving towards camera. The Keymix Node can get us most of the way to a finished shot, but we will also need to align it manually and do a final clean up of problem areas using the Rotopaint Clone brush.

01 Set up the Keymix

In the Node Graph, add a Read node, then browse to the TIF sequence using the file parameter. Set the Format to PAL 720x576 1.46. In Project Settings, set the Full Size Format to Match, and the Frame Range to 1 and 701. We will be removing the person in the middle of the third carriage from the sequence. Add a Sharpen node and set its Size to 2. Add a Keymix and a Roto node. Connect A and B to the Sharpen node and the Roto node to the Mask Input. At frame 350, Roto around the person, as you can see in the screenshot.

02 Add a TimeOffset node

Add a Transform node and place it after the Sharpen node on the A pipe, and then add a TimeOffset node after the Transform node. We can use these two nodes to position a different part of the train footage into the Roto. Move the Transform manipulator to see how it works. Return the Transform's Translate X and Y back to 0. Set the TimeOffset node's Time Offset (frames) parameter to 9. You will see the section of the carriage directly to the left becomes duplicated inside the Roto, as in the screenshot. You can tweak the Roto points if needed at this point.

03 Track the footage

To tidy up the network, delete a Read and a Sharpen node. Add a Dot node and connect the remaining Sharpen node to it. Connect the Transform node and Keymix node to the Dot node. Add a Tracker node and connect it to the Sharpen. We will track from frames 281 to 381. At frame 381, click Add Track and place the Tracker manipulator in the black area just above the person's head on the highest pixel. Click Track to start. At frame 281 click Clear_bkwd. Going frame by frame, check through the results, and tweak the Tracker manipulator if needed.

04 Roto

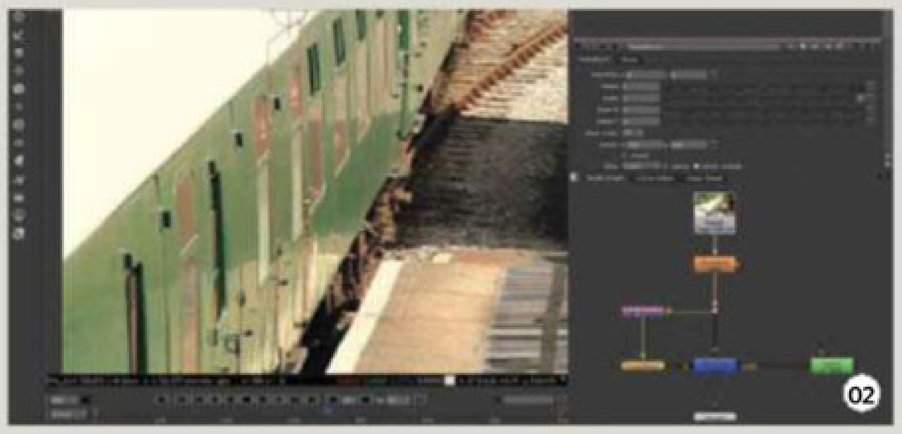
We are now going to use the Tracker to animate the Roto. Open both the Tracker and Roto's parameters in the Properties Bin. Go to the Transform tab for both. In the Roto's parameters, select Root and it will highlight orange. Select the Tracker's Translate X field, hold the Cmd/Ctrl key and drag and drop to the Roto's Translate X to link them. Repeat for Translate Y, Center X and Y. Set the Tracker's reference frame parameter to 350, the frame we drew the Roto on. Scrub the footage, and the Roto will follow along with the Tracker.

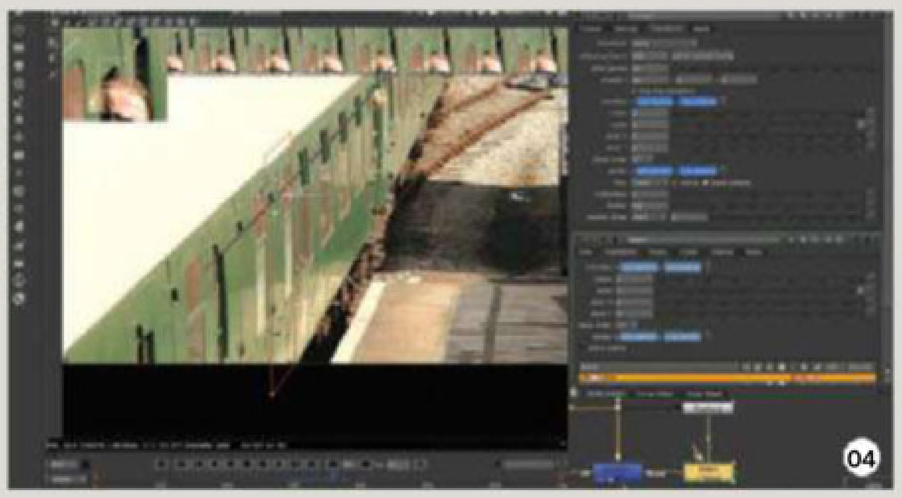
05 Correct the offset

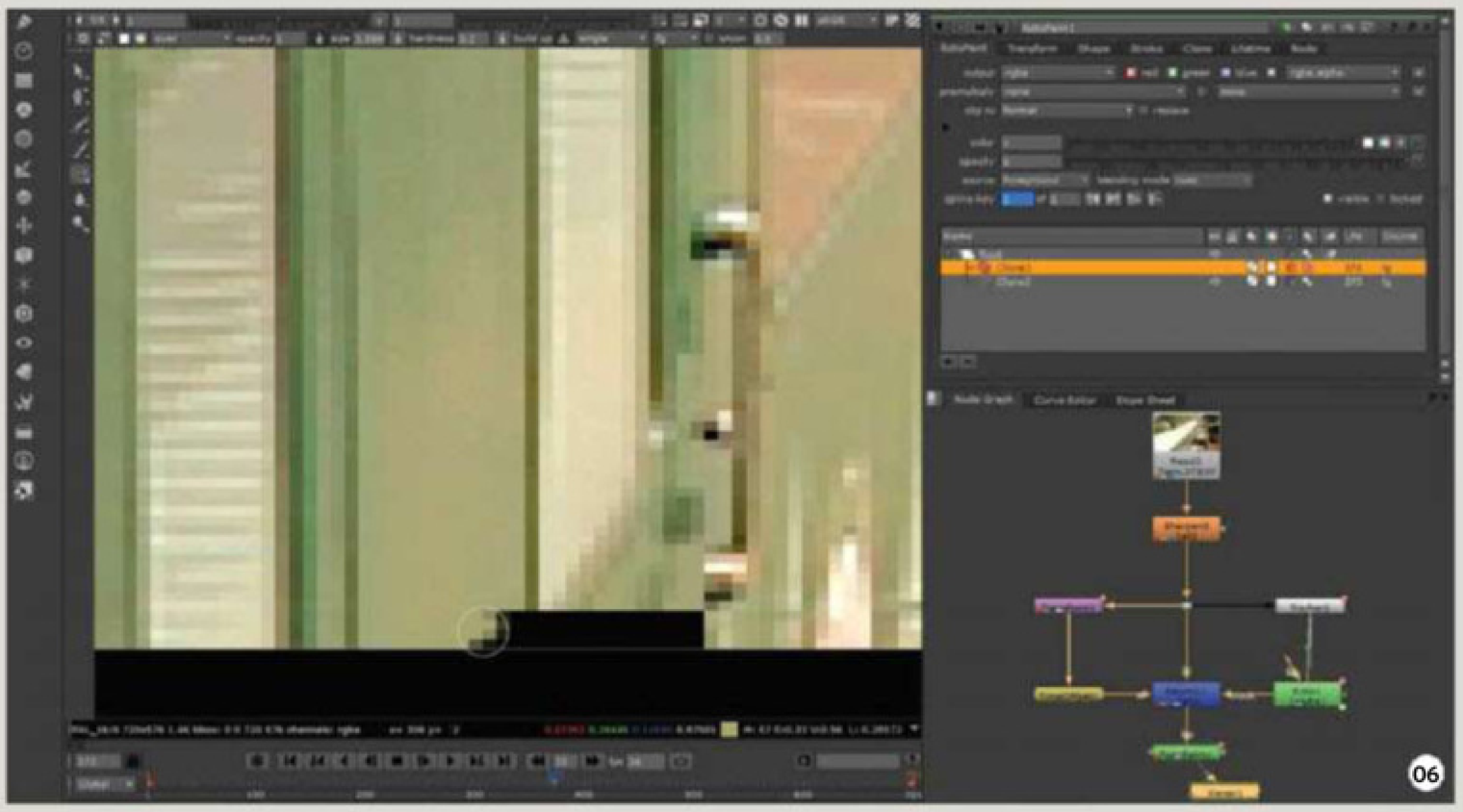
Although the Roto is now animated by the Tracker, you will need to move the points by eye to the same locations they were placed on the carriage on frame 350. Select Bezier 1 and this first for the 100 tracked frames every 10 frames – tweak if needed. By eye, adjust the Roto for frames 382 to 413 and frames prior to 281, where tracking wasn't possible. The offset footage inside the Roto also needs correcting by eye. Use Transform's Translate Y parameter to do this. If your Roto includes a small part of the roof, this makes line-up easier.

06 Clean up

Add a Rotopaint node after the Keymix. Use this to clean up any problem areas, such as around the edges of the Roto, where there could be some colour mismatch. Look out for frames where the person may pop into view for just a couple of pixels, or if there is a reflection in the window to the left of the person. There also could be a black area below the roto at the tail end of the footage, due to aligning the offset footage. The Rotopaint Clone tool and the Blur tool will be all you need to fix those areas.







Hide with patches

If we wanted to preserve the area of the train, as opposed to using offset footage, we could have used patches, but there are problems with this kind of workflow in our footage. To make the patch, you would clean up a frame with a Rotopaint, draw around it with a Roto, Premult and then FrameHold it. Then, with a Transfrom and Tracker animate, you would merge it over the footage. This would result in a much larger, and heavier network, and you would have to Scale and Skew each patch to match the footage. You would also need to animate between patches, and make sure that they correlate. I have provided Patch.nk to show the network.

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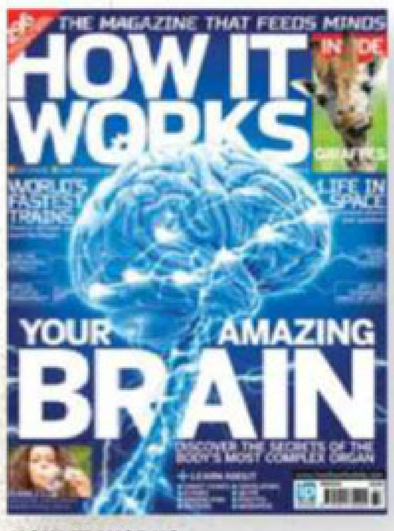

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CHARACTER CREATION *Paluszkin* is one of my old ideas for a character. I used ZBrush for sculpting, KeyShot for rendering and Photoshop for a bit of post-production. I used an HDRI map for global lighting, then two area lights: one white for lighting the face and a second for the glass elements. KeyShot has really cool light shaders. **Paluszkin I,** 2014

Piotr Rusnarczyk

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Software used ZBrush, KeyShot, Photoshop

The WS60 offers great graphics and processor performance in a highly portable design

MSI WS60 2OJ

A light and thin 15-inch mobile workstation that doesn't slow down at rendering

REVIEW BY Orestis Bastounis, technology writer, UK

MSI's 15-inch Ghost laptops are making headlines, with their combination of excellent performance, optional 2,880 x 1,620 3K screens and especially portable, slim and light design. There are two models available – one for gaming, called the GS60, that comes with an Nvidia GeForce card, and a mobile workstation called the WS60, which comes with a Quadro.

The WS60 is only two centimetres thin with the lid closed and weighs just 1.9 kilograms, a notably pleasant change from the overwhelming majority of mobile workstations, which are comparatively thick, heavy computing behemoths. The closest competitor is Dell's Precision M3800, which is even more portable, but only has a 13-inch screen, so is therefore limited to a less powerful Quadro K1100M graphics card.

Every Ghost model has a fourth-generation Haswell quad-core 2.5GHz Intel Core i7 4710MQ processor, which leaps to 3.4GHz in Turbo mode. It supports up to 16GB of memory, and an Nvidia Quadro K2100M is standard. The slightly more advanced, but less svelte WT60 2OJ configuration allows for 32GB of memory.

You get both an SSD and a 1TB hard disk, with the option of two or even three SSDs in RAID. Despite the micro dimensions, the WS60 has a built-in ethernet port and dual-stream 802.11ac networking. The 3K screen is optional, with our unit using a 1080p display.

There's a Thunderbolt 2 port, which provides some particularly fast transfer rates for external storage devices. It doubles up as a DisplayPort connector, but there's HDMI as well for monitor connections. The WS60 is the first workstation to completely banish USB 2.0, since all three of its ports are USB 3.0.

The build quality can be best described as solid. The hard plastic used for the chassis feels chunky, with the spongy SteelSeries-branded keyboard illuminated by a blue backlight that gives the appearance that the keys float above the laptop.

We saw some interesting results from testing. In 3ds Max at low resolution, the WS60 is a few seconds faster than other mobile workstations, such as the HP ZBook 17, completing the Underwater render in five minutes 34 seconds, possibly thanks to the slightly faster CPU. Crank up the detail to 1080p and the gap narrows, finishing the render in 22 minutes 50 seconds.

SPECViewPerf scores also point to the WS60 being a good performer, with a small improvement over the Dell M4800 in all but two of the eight benchmarks. However, Cinebench results fell behind, with 656 in the CPU test and 67.9fps in the OpenGL test.

As is with most mobile workstations, the Achilles' heel of the WS60 is its battery life. PCMark08 reported just two hours 30 minutes, conking out after 83 per cent use. Nothing we're not used to – with mobile workstations, it's a given that battery life is fairly naff, but this is still comparatively low.

At a mere two centimetres high when closed, the WS60 is an incredibly portable mobile workstation

Essential info

Price: £1,599 / $2,087 US

event.msi.com/nb/2014/ws60/index.html

OPERATING SYSTEMS

- Windows 7, Windows 8.1

TECHNICAL SPECIFICATIONS

- Intel Core i7 processor
- Nvidia Quadro K2100M
- Up to 16GB memory

There is a gaming version of the MSI WS60 2OJ available, the GS60, which comes with an Nvidia GeForce graphics card instead of a Quadro

The good & the bad

- ✓ Very light and portable
- ✓ Great processor performance
- ✓ Wide range of storage options
- ✓ Both wired and wireless networking options
- ✓ A great selection of expansion ports
- ✗ Poor battery life

Our verdict

Features	8/10
Performance	8/10
Design	9/10
Value for money	7/10

"The WS60 almost achieves the impossible – great 3D performance in a slim, portable chassis"

Final Score 8/10

Nvidia Quadro K5200

A cut-down K6000 for half the price

REVIEW BY Orestis Bastounis, technology writer, UK

Nvidia has refreshed its range of graphics cards, introducing sweeping changes that provide a welcome performance boost.

There are five new cards in total, including an entry-level Quadro, the K420. This card has the same specification as the older K600, but with a reduced clock speed and a lower price. The rest received significant upgrades, with more memory, Cuda cores and memory bandwidth than previous cards.

We'll no doubt become acquainted with Nvidia's new range in time, but Nvidia agreed to send us a standalone K5200 for testing in our own desktop workstation. As always, the card is sold exclusively by PNY.

This is the most powerful new card, based on the same GK108L design as the top-of-the-range Quadro K6000. It has twice the amount of ECC GDDR5 on-board memory as its predecessor, now bumped to 8GB. There are a lot more shaders: 2,304 in total, a massive leap from 1,506 in the K5000. Memory bandwidth is boosted to 196 GB/sec, up from 173 GB/sec.

Additional memory is a welcome change, and not entirely unexpected, since rival AMD has increased the memory on its cards this year. More GPU memory has a noticeable effect for high-end modelling, where scenes have detailed models and high polygon counts, not to mention final renders at resolutions of 4K and higher.

Two other changes are to the core clock speed and power consumption. The K5200 runs slightly slower than its predecessor, at 650MHz. Power consumption has gone up to 150 watts, increasing from 122 watts.

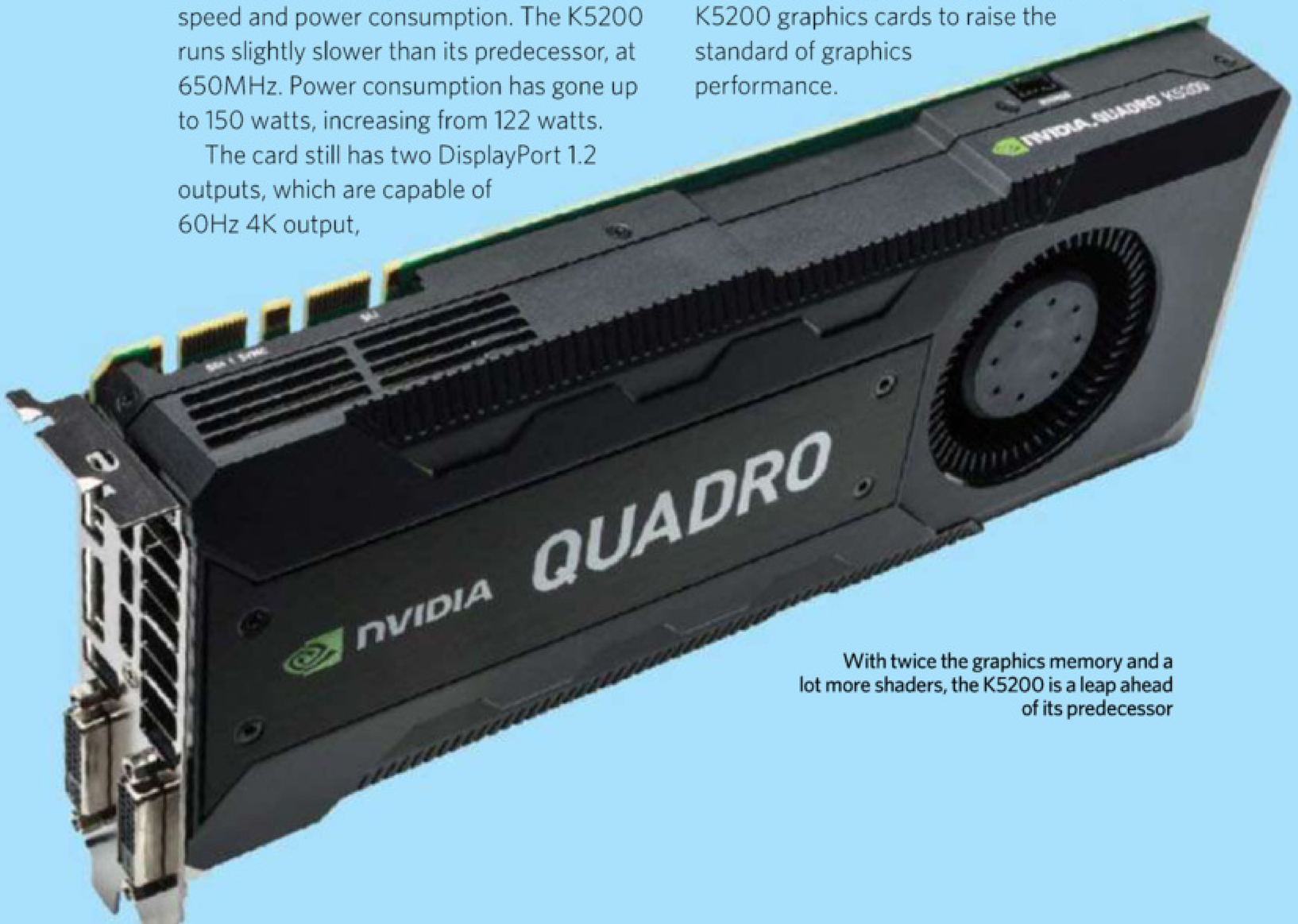
The card still has two DisplayPort 1.2 outputs, which are capable of 60Hz 4K output, along with two DVI outputs. As expected, it's a full-length GPU, measuring in at 266 millimetres. Despite the increase in power consumption, it only requires a single six-pin power connector.

Our test workstation is a mid-range PC, with a two-year-old Intel Core i5-2500K overclocked to 4.2GHz. It's not a patch on the dual-Xeon systems we've tested, but such a high clock frequency can really drive graphics performance, and we saw some superb GPU benchmark scores.

The Cinebench 15 OpenGL test came in at 107fps, just ten per cent shy of the K6000-equipped Scan 3XS GW-HTX35. SPECViewPerf scores were 50 per cent higher than those achieved by Workstation Specialists' WSX6-v3, which we tested earlier this year, and was fitted with a Quadro K5000.

Another benchmark we use called Arionbench tests Cuda performance. The K5200 completed the test in three minutes 22 seconds, compared with two minutes 28 seconds for the K6000. When you consider the K5200 is half the price, it's a close result.

In fact, the K5200 makes Nvidia's top-end card look far less attractive. The gap has narrowed considerably in both specification and performance, so the K6000 is more difficult to recommend. It may be some time before a successor to the K6000 is announced, but until then, expect a new wave of workstations fitted with Quadro K5200 graphics cards to raise the standard of graphics performance.



With twice the graphics memory and a lot more shaders, the K5200 is a leap ahead of its predecessor

Essential info

Price: £1,555 / $2,500

www.pny.com/Nvidia_Quadro_K5200

OPERATING SYSTEMS

- Windows Vista, 7, 8, 8.1
- Linux
- Solaris

TECHNICAL SPECIFICATIONS

- 8GB ECC GDDR5 memory
- 650MHz core clock speed
- 2,304 shaders

Nvidia has squeezed a lot more performance out of its exiting Kepler architecture

The good & the bad

- ✓ A significant amount of on-board memory
- ✓ Superb performance at this price point
- ✓ Only a single six-pin power connector
- ✗ Slightly higher PSU requirements over predecessor
- ✗ Potentially bad news if you've recently purchased a K5000 or K6000 card

Our verdict

Features	8/10
Design	8/10
Performance	10/10
Value for money	9/10

"The K5200 is a welcome upgrade for Nvidia's Quadro cards, with better performance and more memory"

Final Score 9/10

Reflectance gives you the power to create materials never before possible with the Cinema 4D native renderer

Cinema 4D Release 16

Cinema 4D aficionado Tim Clapham takes an in-depth look at the latest release of the software and what the new iteration brings to the table

REVIEW BY Tim Clapham, founder of Cinema 4D training website, **www.helloluxx.com**

One of my highlights of the year was visiting Vancouver for the SIGGRAPH Convention to present for the announcement of Cinema 4D Release 16, Maxon's flagship software. I've been using Cinema 4D in production work at since version 5, and each new release brings more exciting opportunities for creativity and enhanced workflow. This release continues that tradition and doesn't disappoint.

One of the most notable features is the new Reflectance channel, which merges the old Specular and Reflection channels into one. You can now create multiple layers of Specular and Reflection, blending them together to create a variety of realistic textures – none of which would have been possible previously without resorting to third-party renderers, such as V-Ray. The depth of control that is available is great, and true to C4D's reputation, Reflectance has a simplicity that makes it accessible and fun to play around with. This feature alone is such a leap forward for material creation in C4D that we've released training focusing specifically on the Reflectance channel over on our Cinema 4D training website.

Team Render received a well-needed update and this time around it is a much more solid solution than the first incarnation. The Team Render server is reminiscent of NET Rendering, but with a new-and-improved responsive web interface, allowing you to administer your jobs and clients in a server environment. It's handy to be able to monitor your jobs while away from the studio.

There are several other changes with the Cinema 4D renderer, specifically for rendering Hair or Sketch And Toon (Cinema 4D's non-photorealistic renderer). Rendering these effects is now performed with BiRender, which offers a dramatic speed up for these modules. While I welcome the speed enhancements, one of the drawbacks with BiRender is the unification of the anti-aliasing options; I preferred having control over my scene, hair and line anti-aliasing separately.

The introduction of Motion Tracker seems a logical progression from the existing Camera Calibration tool, which enables you to reconstruct a 3D-scene camera from a photograph. Although it seems as if every application is offering a tracking solution of some kind these days, the new, integrated Motion Tracker is well-featured for a version one. There are automatic options that will perform a 2D track, solve and then reconstruct the camera and features at the click of a button. Alternatively you can step through this process manually. Offering both auto and user-placed tracking adds an extra level of control over alternative auto-trackers, but I prefer to track manually, selecting specific features in the shot for accurate placement. Position and orientation of the

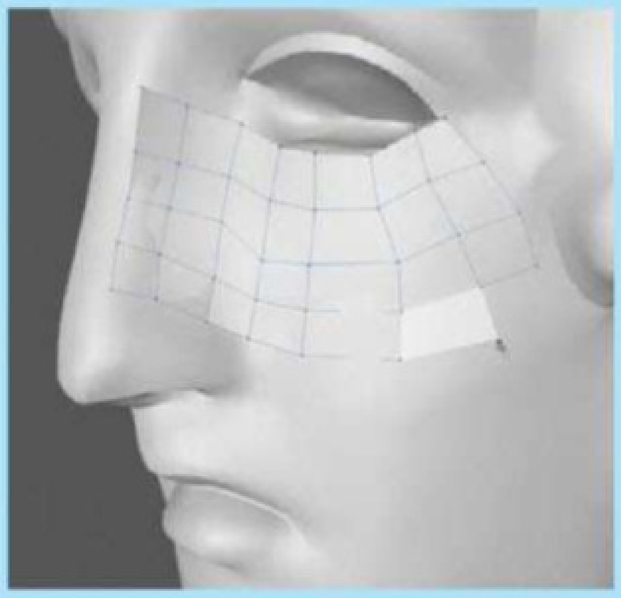
The Motion Tracker integrates a matchmoving solution with both fully automatic and manual tracking options

The new Reflectance channel with multi-layered Reflections and Speculars includes a mode dedicated to rendering cloth surfaces

tracking data is controlled using a series of constraint tags, which means that it's easy to match the scale of the track with your scene. This is a much smoother workflow than switching between apps.

Modelling has its fair share of improvements too. PolyPen is a replacement to the Create Polygon tool on steroids, combining many everyday modelling functions that enable you to move, delete, extrude, bridge, weld and subdivide your mesh without changing tools. More advanced features, such as arcs and reprojection, demonstrate the versatility of the PolyPen.

If you prefer to keep your modelling as procedural as possible, you will love the Bevel Deformer. It has all the control of the Bevel command, but at a non-destructive level. Deformers have all been improved with the addition of falloff. This must have been a long-time user request and is a feature that I already use frequently in day-to-day work.



Modelling workflow is greatly improved, with PolyPen providing advanced features such as reprojection

As well as the larger new features, there are numerous enhancements throughout the application. It is great to see these smaller, but important workflow improvements getting attention. Combined with the new additions, this makes for a feature-packed release.

Essential info

Price: £2,600 / $3,695

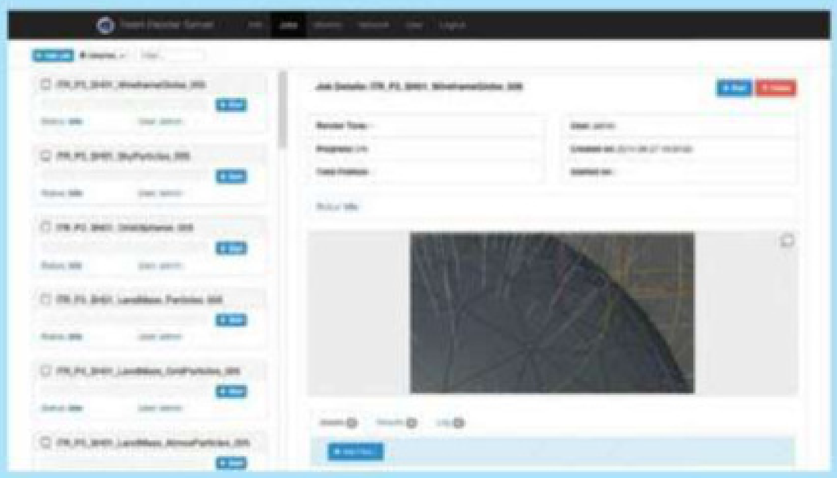
www.maxon.net

OPERATING SYSTEMS

- Windows 7, 8, 8.1 – 64-bit
- Windows 2012 Server 64-bit
- Apple Mac OS X 10.7.5+

OPTIMAL SYSTEM REQUIREMENTS

- OpenGL 2.1 Compatible AMD & Nvidia graphics card
- Intel Pentium 4 / Athlon 64



Team Render now offers a web-server solution for improved control when managing network rendering

The good & the bad

- ✓ New Reflectance channel allows multi-layered Reflections and Speculars
- ✓ Integrated matchmoving with new Motion Tracker
- ✓ Enhanced modelling workflow with the PolyPen
- ✓ Team Render server greatly improves network rendering
- ✗ UV Tools & Bodypaint only see one minor new tool added
- ✗ No improvements made to XPresso
- ✗ No nodal material system

Our verdict

Features	9/10
Ease of use	8/10
Quality of results	9/10
Value for money	8/10

> A solid update offering some great new features as well as improvements throughout the entire program

Final Score 9/10

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The team reveals its new artist-friendly crowd-simulation tool, capable of rendering thousands of people in a matter of minutes

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Andrei Cristea

The lead character artist at CCP games gives us an insider's perspective into how this competitive industry works

inside

> "There is something special about concepting a character and then bringing it to life"

Andrei Cristea, Page 92

Harotemis
A personal piece by Andrei Cristea. The concept was the protector god of hunted animals, inspired by Ethiopian tribes

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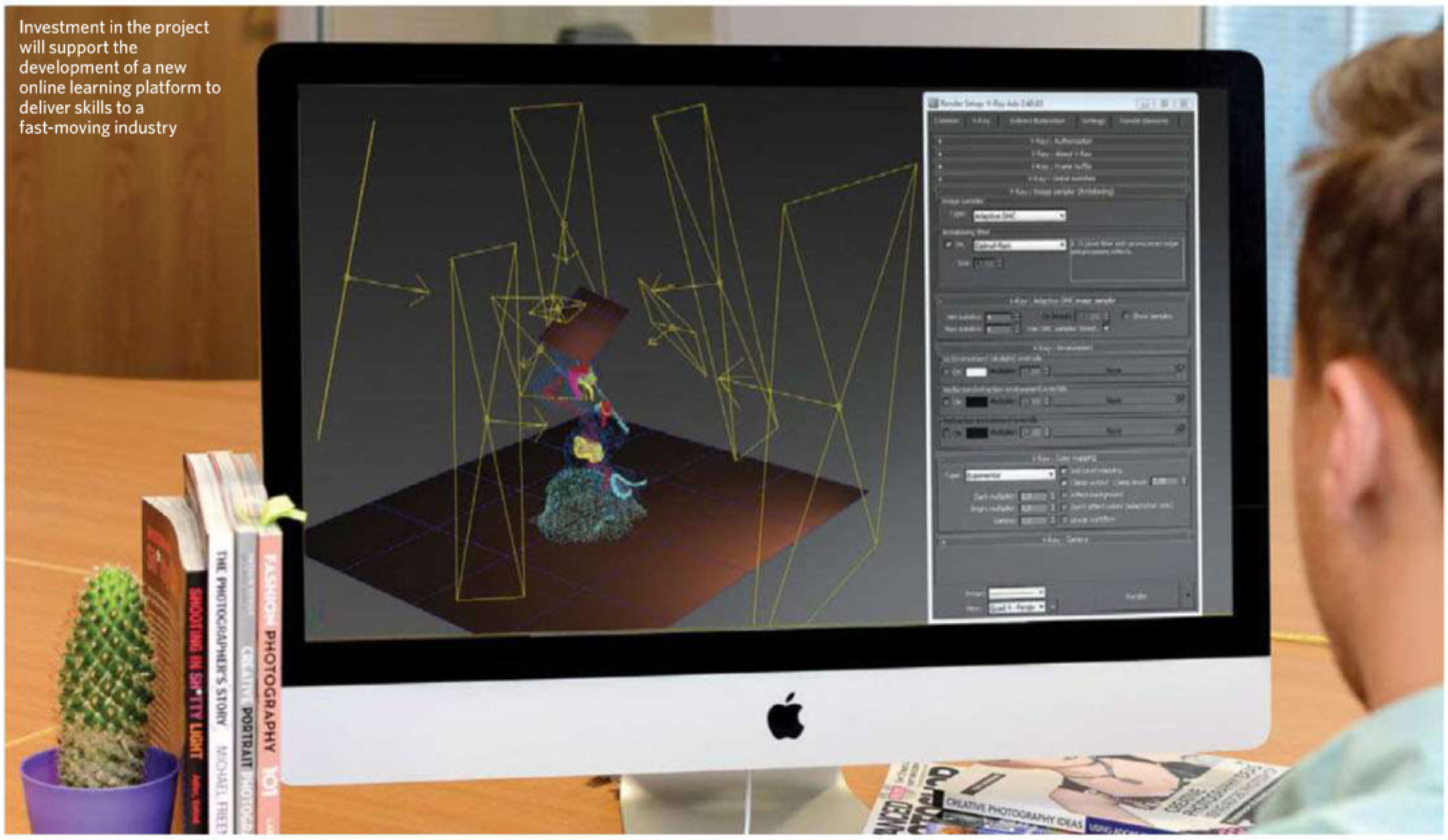

Investment in the project will support the development of a new online learning platform to deliver skills to a fast-moving industry

Multimillion-pound training for creative industries

Minister Ed Vaizey announces new cutting edge training with a Next Gen Skills Academy worth £6.5m

MPC is just one of the companies that is backing Ed Vaizey's Next Generation Skills Academy, which aims to provide training in the creative sector.

UK minister for culture and the digital economy Ed Vaizey has announced that together with several industry backers including Framestore, Double Negative, MPC and Sony Computer Entertainment Europe, a new Next Generation Skills Academy is soon to train artists for a skills gap in professional work. The academy is set to provide the training in a new project aimed to continue growing the UK creative industry and prepare work-ready games designers, animators and VFX artists for a sector worth at least £71 billion a year to the UK economy.

With industry backers contributing money and resources worth £3.6 million over the next three years and the government funding around £2.9 million, the Next Generation Skills Academy will be developing and offering a range of entry-level qualifications, higher-level apprenticeships, short courses and online learning opportunities from as early as next year. Initial intentions are to train 1,320 people to degree level, as well as deliver more than 1,000 other short courses for any artists who need to update and extend their skills and abilities.

The announcement follows the launch of the Creative Industries Strategy (Create UK), an industry-led strategy launched in July 2014 that will see both businesses and the government work together to maintain the UK's position as a world leader through to 2020.

To learn more about the Next Generation Skills Academy, head online to www.bit.ly/1qxmzW8. Let us know how you feel about it on our Facebook page, www.facebook.com/3dartistmagazine.

● **HAVE YOU HEARD?** ▪ Cinesite is working on the VFX for upcoming film for 2015, *Pride And Prejudice And Zombies*

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Autodesk goes rental

The software giant becomes subscription-only

Following Autodesk's decision to give students and educational institutions worldwide free access to the full version of its software, the company has another piece of news for its users.

After announcing new subscription plans on all suites and software last year, Autodesk intends to discontinue perpetual licences altogether within just two years, according to Autodesk SVP of industry strategy and marketing Andrew Anagnost. Giving a presentation at the company's recent annual Investor Day, Anagnost reportedly explained that rather than all at once, the transition to subscription will be rolled out slowly from region to region, one product at a time.

Speaking at Autodesk's Investor Day, SVP of industry strategy and marketing Andrew Anagnost announced the company's shift away from perpetual licences

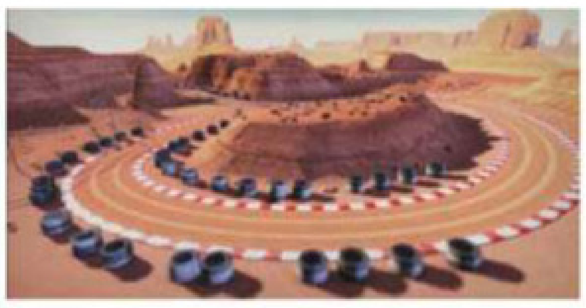
Though there's been plenty of negative feedback on the decision – which will generate more profit in the long-term and cost customers more than they are currently spending – for studios that only need cheap software on a per-project basis it's an advantage. After removing perpetual licences, the cost for Autodesk's subscriptions is likely to go down with new packages for committed users, while big software releases will be more frequent.

Houdini Indie for Unity

Side Effects aims to tempt indie game developers

Now on the Unity Asset store as a rental-only option from $199 a year, Houdini Indie can be used in game production throughout the entire pipeline, from creating prototypes to procedural modelling. A few restrictions apply, such as a limit to three Houdini Indie licences per studio as well as a resolution limit to Full HD when rendering animations with Mantra.

Unity artists will be able to load anything they've created directly into the Unity editor to achieve custom results with its Unity plug-in for Houdini Engine. For those who don't need to author their own assets, a standalone Houdini Engine Indie license for $99 a year is also available.



For more information about Houdini Indie tools and its integration with Unity, visit Side Effects Software's website at **www.sidefx.com**

3D animation in Photoshop

Mixamo announces support to users of Photoshop CC

Founded in 2008 as a spin-off from Stanford University originally created for markerless motion capture, Mixamo is a company focused on democratising 3D character animation

The latest release of Photoshop CC includes support for 3D animated characters – a functionality developed through Mixamo's technology. Photoshop users can import animated characters in COLLADA format in order to edit them in a number of ways before rendering with the Render Video option.

"With Mixamo's technology, we can import 3D characters along with their animations into Photoshop, edit and export them using one of the world's most popular design tools," said Winston Hendrickson, vice president of engineering, digital imaging products at Adobe Systems.

Software shorts

Bringing you the lowdown on product updates and launches

Blender 2.72 released

The user interface has been further improved in Blender 2.72, with options such as Pie Menus now available and better Tooltips. Other new features include Cycles CPU rendering support for Volume and Subsurface Scattering, a new intersection tool added in Edit Mode for modelling, and a streamlined texture-painting workflow for easy access to painted images and UV layers. Download Blender 2.72 for free at www.blender.org/features/2-72.

Video Copilot Elements 3D V2

Video Copilot has released its Elements 3D V2 tool for rendering 3D models and animation natively within After Effects, without the need for the intense re-rendering of traditional 3D. New features include a viewport that looks more like one in a 3D package, more options for editing imported geometry, and an updated render engine. More at www.videocopilot.net/products/element.

Cinema 4D Lite R16 in Adobe After Effects CC

Maxon has just announced the availability of Cineware 2.0 as well as Cinema 4D Lite Release 16 in the latest version of Adobe After Effects CC. This new availability will include access to many of the new features of the latest Cinema 4D R16 such as multi-layered reflections. For more information on this new release, visit Maxon's website at www.maxon.net.

Fujitsu's new line-up

The leading Japanese technology company reveals a German-made series

The CELSIUS workstation family. Learn more about Fujitsu's workstations at **www.fujitsu.com/global/products/computing/pc/workstations**

Adding to its CELSIUS range of workstations, Fujitsu has announced the launch of the higher-end CELSIUS R940 and M740.

Ideal for intensive computing tasks, the dual-core processor R940 and single-core M740 can support a huge variety of GPUs and CPUs alike.

"I'm confident they're the most configurable machines on the market," enthuses product manager Leigh Schvartz. "The M740 alone has over 20 processor options for that machine." Components include DDR4 memory, a selection of the latest FirePro and Quadro graphics cards and turbo-fast PCIe 512GB SSD drives.

DID YOU KNOW? • DreamWorks is allegedly in talks with Japanese conglomerate SoftBank claims *The Hollywood Reporter*

Project Focus

Postoffice Crowd Tool

We talk to the team behind a new artist-friendly crowd tool that can render 30,000 people in just a couple of minutes

Project Postoffice Crowd Tool
Description The tool is an in-house crowd simulator that the team created a film for to test out. The tool is highly directable and artist-friendly, so you can build crowds without any technical knowledge
Studio Postoffice Amsterdam
Country Holland
Bio Postoffice was founded by Ad Rietvelt and Evelien Hess in 1986. It started out as an editing studio, but in the years since, it has grown to become a full post-production house with departments for compositing, editing, grading, sound design and music composing
Website
www.postoffice.nl

Bram Vleugel
VFX supervisor/compositor
Boyo Frederix
Head of 3D
Bram Buddingh
Head of NUKE

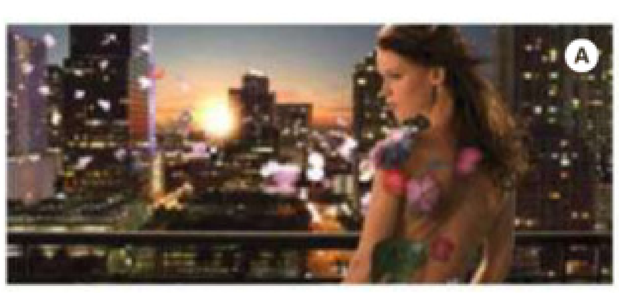
"We think that Dutch directors and producers are getting less scared to use VFX in their work," states VFX supervisor and compositor at Postoffice Amsterdam, Bram Vleugel. For the up-and-coming studio, which has expanded to house 25 artists since being founded in 1986, it's definitely news it has been waiting for.

Using Maya, NUKE, Flame and a variety of smaller packages, the VFX team has already proven it can handle feature film projects. In between creating effects for film and TV, however, the team has also been working on something even more exciting: its very own piece of in-house software – a crowd-simulation tool, the video of which has gone viral.

"Every studio in Amsterdam has Maya, has NUKE, has After Effects," explains head of 3D at the studio, Boyo Frederix. "If you want to stand out, you have to create your own tools." In 2012, Frederix himself single-handedly began to develop the crowd-simulation software using Python in Maya, all for a local supermarket commercial the team had been working on. "It was okay, but this year the World Cup came and we just wanted to take it up a notch," he continues, "so we did our own project to show it off using table soccer." The video showcased a new card-based crowd system that was both highly directable for artists and quick to render due to the lack of complex models involved: the team used it to render 30,000 people in minutes. Ultimately, it got the attention of a pretty big player – The Foundry.

> "Every studio in Amsterdam has Maya, has NUKE, has After Effects. If you want to stand out, you have to create your own tools"
> **Boyo Frederix, Head of 3D**

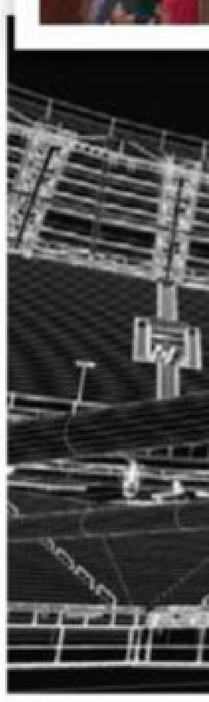
"We actually did a session with The Foundry where we just laid out everything we did for that table soccer commercial and the crowd tool, and then all the questions started," Frederix explains. "People were asking us whether we could make this for NUKE." It's now been a month since the team have started using any free time they've had from their regular VFX work to develop the tool for just that, and as far as crowd simulation goes, it could be pretty unique. With it, compositors would have the ability to create crowds straight in their NUKE viewer, where they could direct a library of pre-recorded actions for each person or pre-rendered 3D mesh on the card system to have ultimate control over every movement, or use comp tools to add lighting, masks



A The team used its proprietary relighting pipeline to allow it to relight real people shot in front of a green screen, then used this to match the crowd's lighting to the shot. It's worth noting that it also works with pre-rendered 3D characters

B The Melkunie cow was created for a campaign that has been running for over 20 years that had originally used a puppet, but now needed a CG cow. The team used a 3D scanner to get an accurate model and re-created the cow in Maya

C "When we have free time, we work on the Crowd tool," says Bram Buddingh, Head of NUKE. The team has just come back from South Africa, where it recently presented the tool in both Johannesburg and Cape Town to a very positive response



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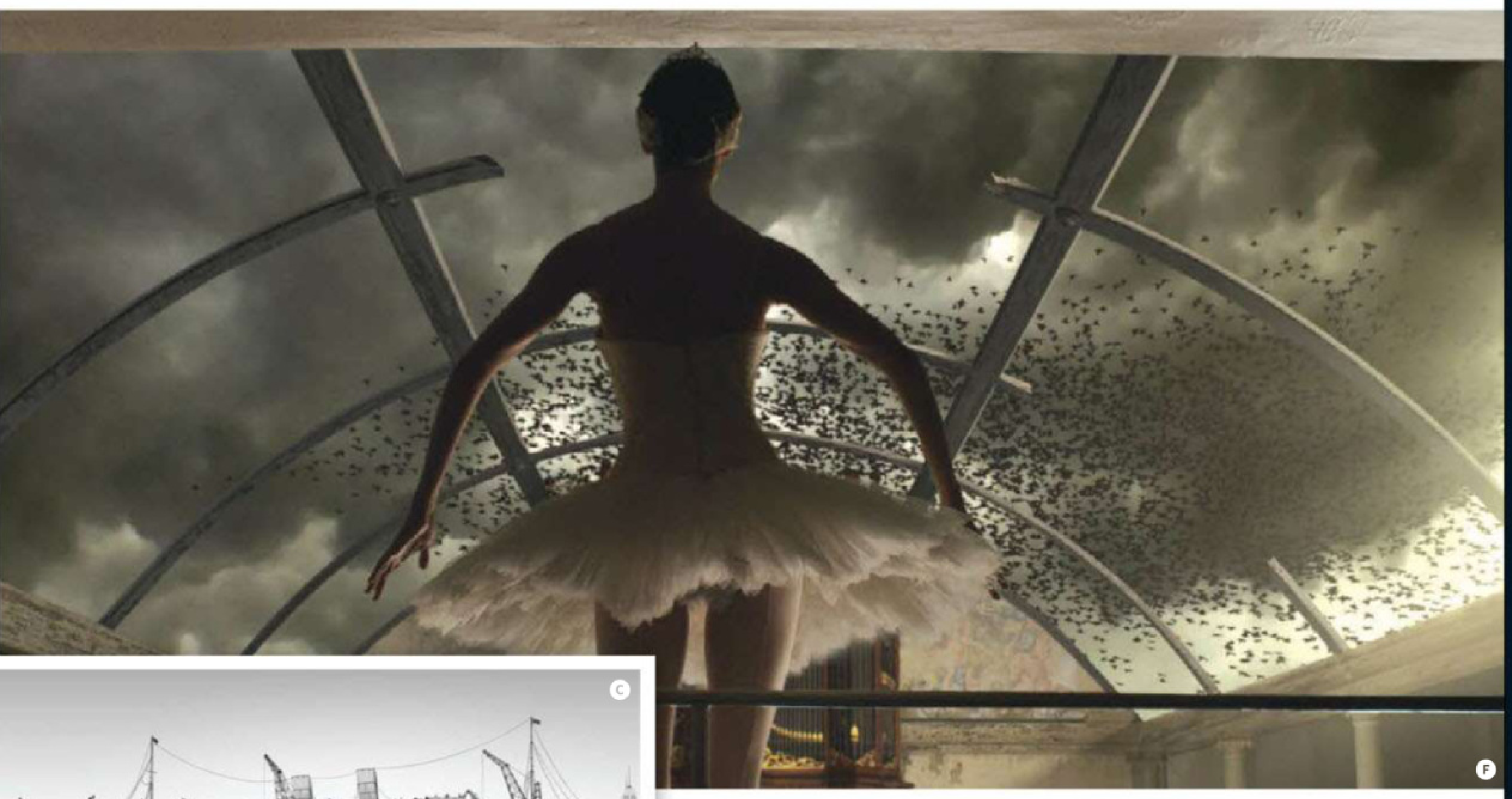


How to create a card system

Bram Vleugel tells us more about the workflow in producing highly directable crowd

"The first thing to do is to create a good library of actions. Sit, stand, quiet, cheering and the wave are a couple of basic actions that will get you a long way," says Vleugel. "To get some more variation, do some time offsets. [Use] program sliders to be able to set the percentages of which action should be used, then instance the right amount of every action into a particle field – now you have a crowd. Because we work in advertising, we have tight deadlines so we need a solution that is really fast. We rendered 30,000 people in just a couple of minutes. This is because we use filmed people or pre-rendered characters on cards. We used real footage so we had all the fine details, and we have a NUKE setup so the keying was really easy."

or shadows to the crowd interactively. "3D characters are harder to make photoreal than actual filmed humans," points out Vleugel, "Crowd shots are often just a couple of seconds long, so for 99 per cent of the shots the humans don't need intelligence, and the humans can be filmed with multiple camera angles, which still gives the artist a lot of flexibility on any angle they need."

The NUKE tool – set for release in early 2015 – is already working well, but with a team that has so much passion and drive, it's no surprise that it's far from done. Postoffice had also developed other in-house tools in the past such as one for liquids, and with the success of the crowd tool, plans to release others to the public are on the cards. Combined with new tax laws that will mean more VFX work will find it's way into the country, the future certainly seems bright.

D "For the World Cup 2014, we rewrote the whole tool to make it faster, more stable and added the relighting tools," explains Vleugel. "We shot a new library of supporters and made the tech demo that spread virally on the internet"

E "Things like our 3D crowd tool show our clients that high-end visual effects work is within reach," states Vleugel. The version of the tool for NUKE is currently still in the alpha stage of it's development, but it's due for release in 2015

F If you want to find out more about the team and its current and previous projects, visit Facebook and Twitter for further updates at **www.facebook.com/postofficeamsterdam** and **www.twitter.com/PostofficeAdam**

Industry insider

Andrei Cristea

Lead character artist at CCP Games

Lead character artist Andrei Cristea explains what compelled him to join the industry and how he builds realistic 3D models for EVE

About the insider

Job title Lead character artist at CCP Games

Location Iceland

Website www.undoz.com

Biography Andrei Cristea's 3D journey started as a child learning to type in BASIC code on Z80 clones and later went to study computer science. After joining Demoscene and getting hooked on 3D graphics, he started to freelance. Working in almost every field related to CG, Cristea now has over ten years' experience specialising in character art

Graphic artist Andrei Cristea currently lives in Iceland and has worked for CCP Games for the past four years. His story in the world of 3D all started after he first studied computer science to be a programmer and then became involved in the Demoscene. "I started with 3D because it had a technical and a puzzle-solving side that I was drawn to. In recent years the tools have evolved in such way that it is not as important as it used to be and you can focus more on the creative side," explains Cristea.

His creative streak continued, and after working at Demoscene on numerous CG projects, he finally focused solely on establishing himself as a freelance artist. Having worked with companies and campaigns including *EVE Online*, e-on Software and Hearst magazines, he now has over ten years' experience in the industry, specialising in character art.

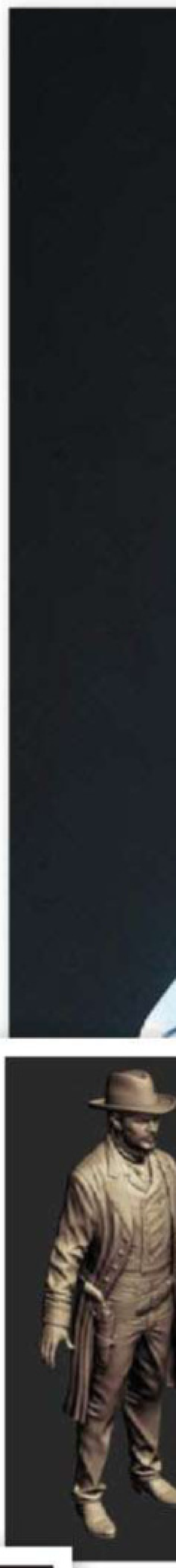
"I am really proud of the work that goes into the *EVE* universe cinematics that we reveal each year during the *EVE* Fanfest. I am part of a small team of six people, that every year go through a three-month-long adrenaline rush to complete it."

How did you get into character design and specifically 3D character design?
I have always found characters fascinating in all mediums, from sculpture, figurative art, books, graphic novels, games and movies. There is something special about concepting a character and bringing it to life from a visual perspective. I see characters as one of the most challenging aspects of 3D modelling and, as such, it can be both amazingly satisfying and frustrating at times. It is a great learning path that allows you to dive into topics like anatomy, history of art and even robotics.

What aspect of creating 3D excites you the most?
I find modelling the most enjoyable. Especially the first stages of a concept sculpt when you don't pay attention to the surface quality or any other technical aspect, and you can focus solely on design, proportions and rhythm. Most of the work that follows is put into preserving this.

How do you get your characters to look realistic?
There are a couple of aspects [to] this; you have to make sure that the anatomy is grounded in reality and that you can read the structure underneath the surface. This is crucial. The way the skin lays and folds over fat, muscles and bones, the way a piece of clothing wraps over an anatomy, how all these elements have weight, scale and all affect each other. When it comes to texturing and shading, you have to consider how different materials react to light: how conductive and dielectric materials absorb and reflect light, the way surfaces are coated and how they wear and tear in real life. At the same time, you have to be aware of concepts like linear-workflow lighting and physically based rendering for both real-time and offline rendering.

When you're working on projects, what is your typical image workflow?
I start most of the characters with a pre-production stage. I consider this crucial, and I try to allocate a decent amount of time for it. This is where I start sketching the character, developing a backstory, gathering references and establishing the art style. Next, I use ZBrush to block out the concept in 3D and after I reach the stage in which I am happy with the basic forms, I begin retopologising and UVing the model using ZRemesher and Maya. After reprojecting the new topology and finishing detailing the model, depending [on whether] the model is for real-time or offline rendering, I bake the Normal or Displacement maps. For texturing I use Photoshop and 3D Coat extensively.



portfolio highlights

Some major projects that Andrei Cristea has worked on:

2014 *EVE Prophecy Cinematic*
2010-2014 *EVE Online*
2013 *EVE Origins Cinematic*
2012 *World Of Darkness*
2000-2010 Freelancer (e-on Software, Hearst Magazines, RustMonkey Studios, Nice Render, Contrast, Factor, Delmer, Lost Toy)

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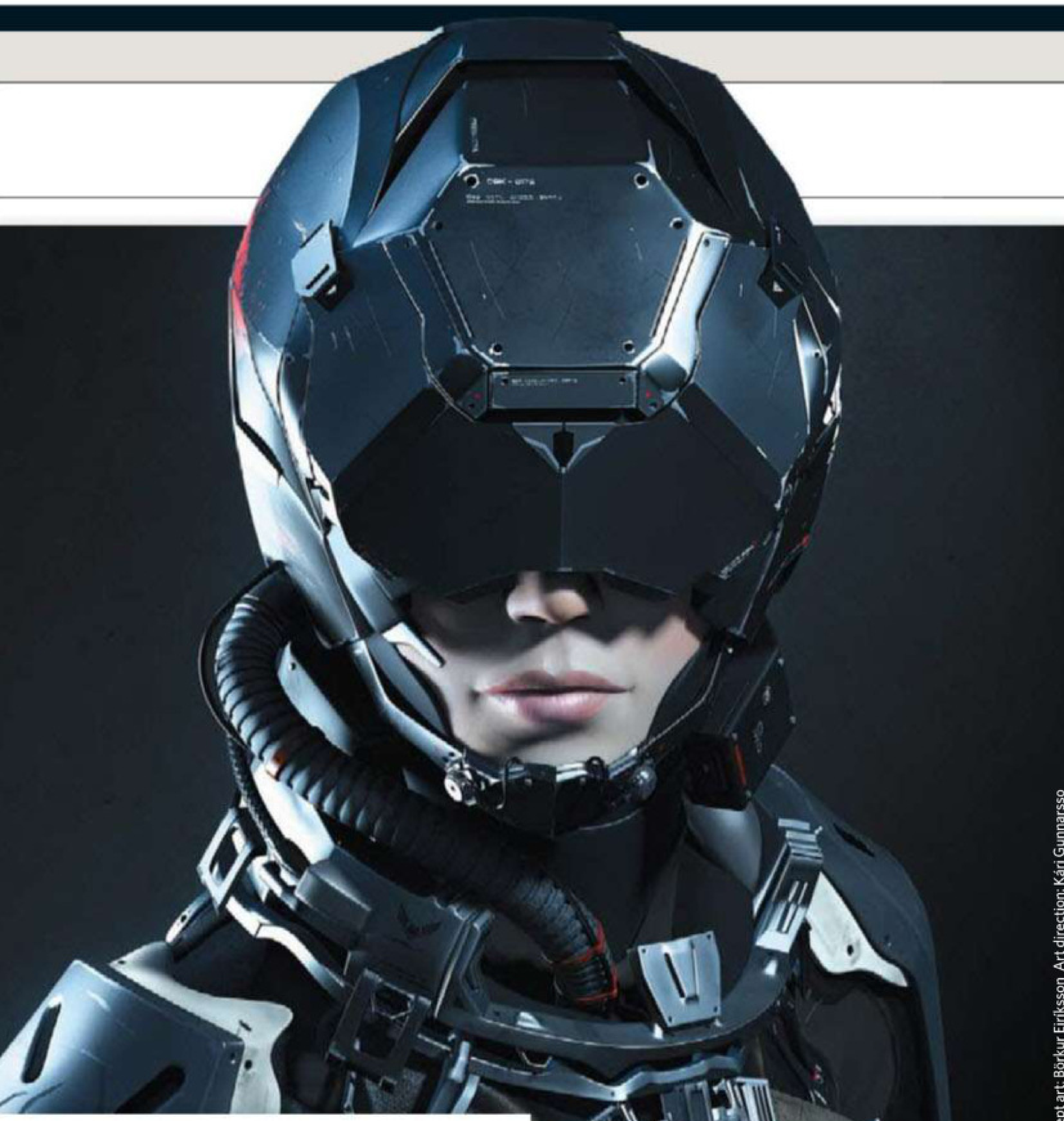
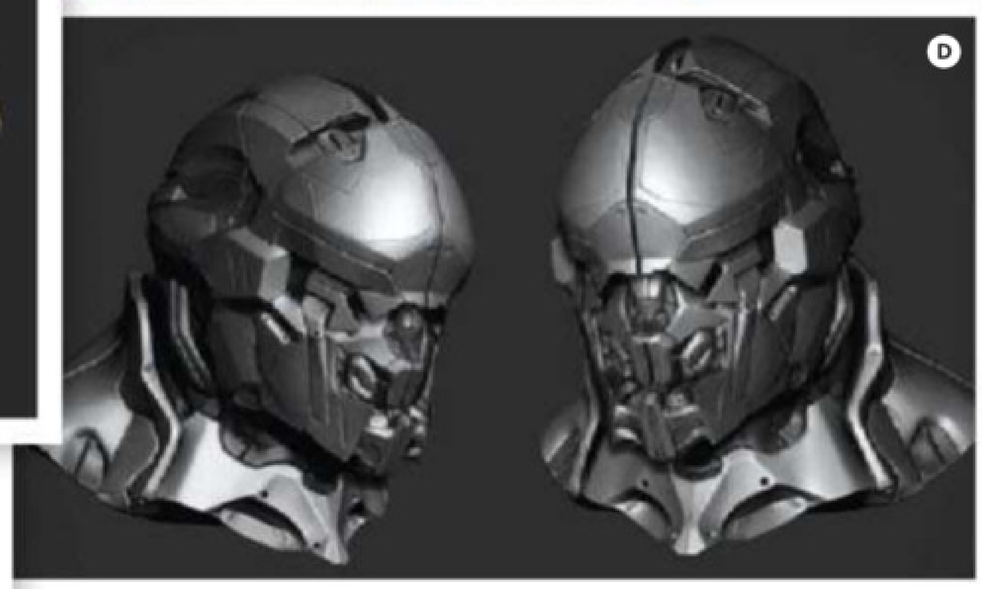


CCP Concept art: Börkur Eiriksson Art direction: Kári Gunnarsso

E

B



D

C

Which software?

Cristea points out which 3D software is essential to his image workflow in order to build his realistic characters

ZBrush for sure. After using it for so many years, it feels like a natural extension. It is the software that had the biggest impact in 3D modelling in the last ten years and it brought so many out-of-the-box concepts to the field, redefining everyone's way of working.

“There is something special about concepting a character and bringing it to life”

A *Girl With Headphones* – This project of a girl listening to music is a personal model of a bust that was sculpted in ZBrush and rendered with V-Ray in 3ds Max

B *Seth* – A personal artwork inspired by the character of Seth Bullock from *Deadwood*. It's a rigged model that served to test workflows between ZBrush and 3ds Max

C *Harotemis* – This is another personal piece that at its core had the concept of the 'protector god of hunted animals', inspired by several varieties of tribe from Ethiopia

D *Ahelm* – This model started out as an exercise in hard-surface sculpting in ZBrush. This impressive model was sculpted entirely from an initial cube

E *Ran* – This is a character model that has been made for the *EVE Prophecy* cinematic, which is based on a concept by both Börkur Eiríksson and Kári Gunnarsson

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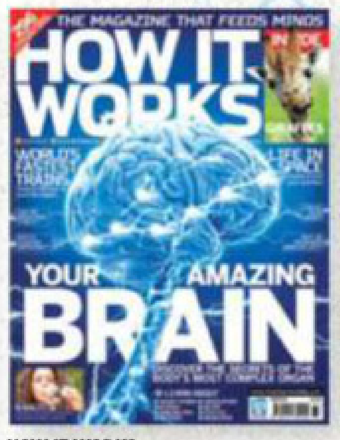

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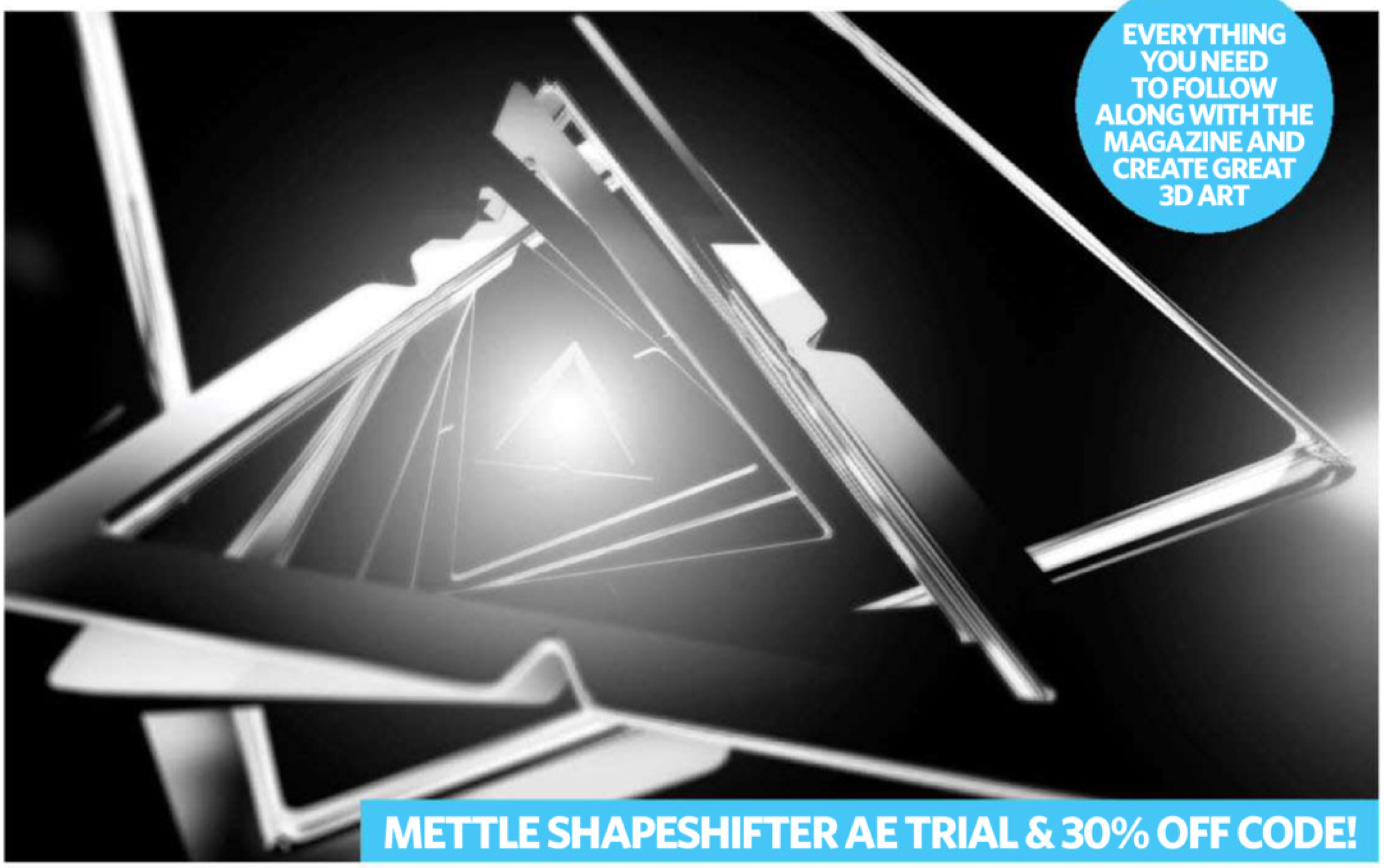

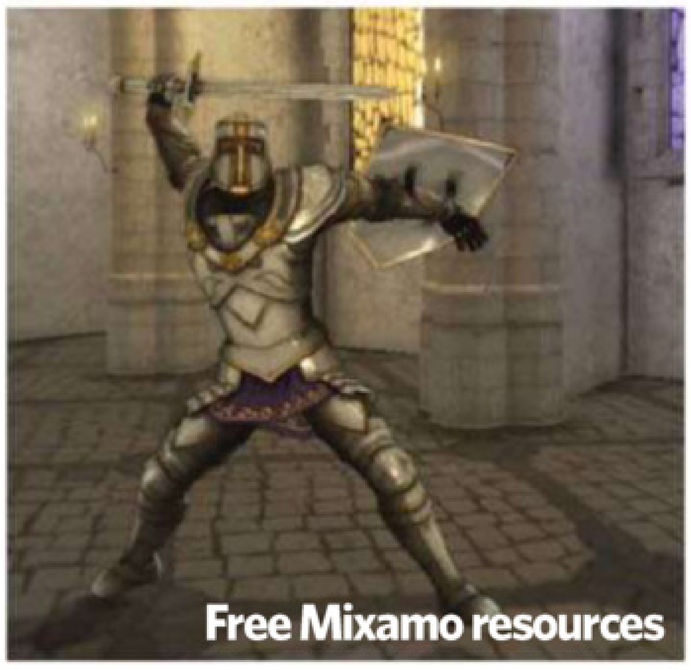

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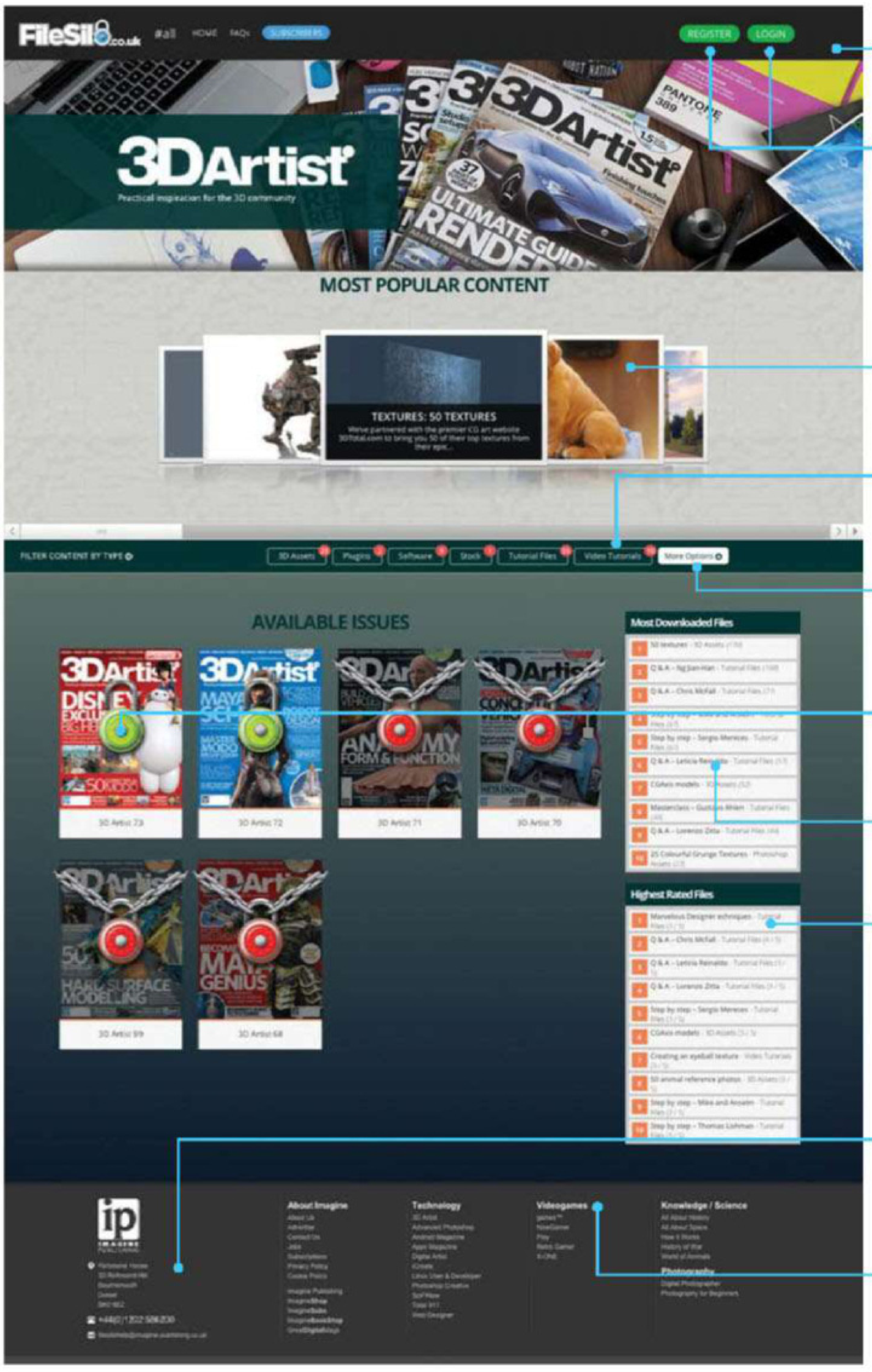

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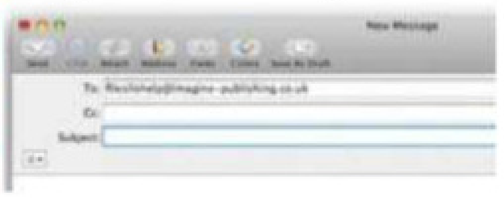

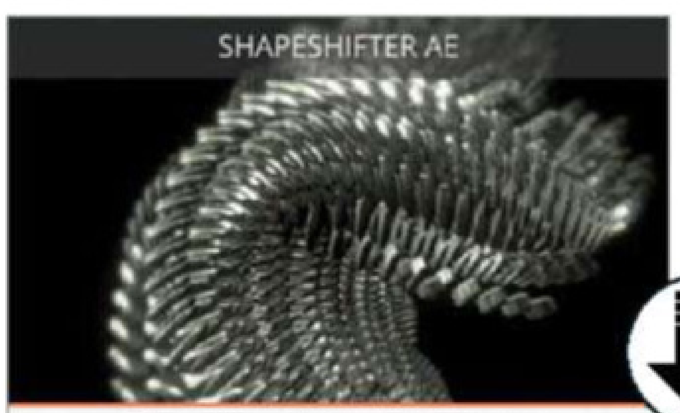

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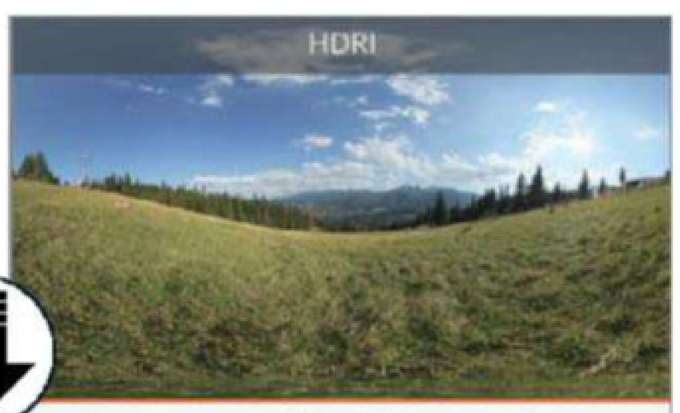

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